FOOD AND BIOBASED CAFETERIAWARE COMPOSTING FOR FEDERAL FACILITIES IN WDC

A Perspectives Roundtable Discussion

USDA, ARS, Henry A. Wallace Research Center
10300 Baltimore Ave.,
Building 005, Conference Room 21
Beltsville, MD.20705

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Edited by

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Preface

Richard Reynnells
National Program Leader, Animal Production Systems
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(Speaker Contact Information is Included in Appendix C)

These post workshop proceedings are provided to encourage and facilitate additional discussion and implementation of plans to further the use of biobased cafeteriaware as part of a food residuals composting program. These proceedings supplement the on-site proceedings. We expect these efforts to stimulate additional workshops or symposia that support government procurement decisions and enhanced utilization of food wastes and biobased cafeteriaware, and food processing residuals.

Some authors chose to provide, in addition to their abstract used for the on-site proceedings, their powerpoint slides and/or a full paper on their topic. These extra efforts are greatly appreciated. As possible, powerpoint slides were converted to a black and white format which allows a higher quality proceedings. Contact the author to ask for a copy of the original colored slides.

Additional copies of these proceedings are available from the Co-coordinators and from the US Department of Agriculture Agricultural Research Service or the Cooperative State Research, Education and Extension Service websites.

Welcome and Organizational Comments

Richard Reynnells
National Program Leader, Animal Production Systems
USDA/CSREES/PAS
(Speaker Contact Information is Included in Appendix C)

On behalf of the organizing committee and sponsors, I am honored to welcome you to this ground breaking workshop, the "Food and Biobased Cafeteriaware Composting for Federal Facilities in Washington, DC". Speakers will provide full written papers shortly after this meeting. It is important you realize that all are welcome to provide a position paper on any topic covered by these discussions, for inclusion in the post-meeting proceedings. You may provide your paper in electronic format to me or the other Co-Coordinators, by December 16.

The overall goal of the presentations today is to clarify what inhibitors currently limit progress in the biobased cafeteriaware industry in the United States, as well as in the food composting industry. The synergistic relationship between the biobased product industry and the composting of food wastes from our many facilities that serve food, will also become more apparent. Specific purposes are outlined in Appendix B.

Recycling is essential to the long term sustainability of our planet, and this meeting is one component in moving toward a goal of more responsible environmental stewardship. Land-filling economically compostable material such as food waste and compostable cafeteriaware does not appear to be a viable alternative to solving our resource management problems.

We have a full agenda, with time set aside for discussion of these topics. Rather than statements of opinion, these discussion periods are meant to be more brain-storming, dialogue about strategies that have been successful, and suggestions for piloting new strategies on institutional, municipal, and regional scales. We value everyone's suggestions and ideas on these topics, so directness and succinct comments will allow us to hear from all who wish to contribute. Comments will be recorded and transcribed for inclusion in the proceedings.

Likewise, we request speakers pay attention to the moderator so that you will know when your allotted time is over, and try to end on time. In order have enough time for the discussions, we need to honor the admittedly brief times available for each presentation.

Your full proceedings will be mailed to you, so it is essential that your contact information be complete and readable. We may have a follow-up conference in 2006, and we will want to be able to provide that information to you. Again, we thank you for your commitment to participate in these important discussions

Charge to the Roundtable Participants

Patricia D. Millner, Research Microbiologist
USDA/ARS/BARC/SASL and EMSL

Developments on several fronts are moving forward in parallel. These fronts are independent yet interconnected. The fronts are:

1. Biobased Product Research, Development, and Marketing;

2. Greening of Government and Institutional Operations; and,

3. Compost Quality Certification and Use.

Two federal level mandates currently direct federal agency action on these fronts. The 2002 Farm Bill which deals with Biobased Products, and Executive Order 13148 "Greening the Government Through Leadership in Environmental Management." You will hear more details about both of these during this roundtable.

Here at the Beltsville Agricultural Research Center we have conducted two pilot projects with federal agency cafeterias in downtown Washington, D.C. Based on the positive results from these pilot projects and on the programs and successes occurring along these lines in other areas of the USA, we see an opportunity for federal facilities in the Washington, D.C. metropolitan area to model the use of biobased food serviceware, food composting, and organics recycling in the context of federal-state-and local public/private partnerships. A Federal level program based on sound science, product quality criteria, and economic and life-cycle analysis for sustainability would serve as a model for other institutional and city endeavors. It could also help reduce the apprehension of dealing with post-consumer foodservice materials that some jurisdictions continue to express relative to potential adverse factors such as odors and pathogens.

The charge to this group is to assess what specific approaches are needed to move forward on these fronts in concert. You have been invited to participate in these discussions because of your particular experience and knowledge on one or more of these topic areas. Through open and direct discussions and the sharing of your perspectives, we expect that you will suggest some strategies and options, perhaps involving synergistic interactions, that collectively will help develop a federal 'Green' Cafeteria, and 'Sustainable' Landscapes program, both based on quality, renewable, biobased products.

The basic concepts of recycling and renewable resource use that are involved here are widely accepted. It is <u>how</u> to put this into practice as a unified program on a large scale that is the current challenge. The Washington area comprises three localities: The District of Columbia, Maryland, and Virginia. Each has their own existing regulations, permit requirements, and zoning rules regarding solid waste and composting. Transportation and siting, as always, are challenging issues that need to be addressed directly. Product quality standards, whether for biobased food serviceware, or compost, are critical to success. Input from appropriate industry and government agencies is essential to establish realistic criteria, tests, and performance standards that build on existing knowledge and science.

Provisions Of The Federal Biobased Products Preferred Procurement Program And Progress In Implementation

Marvin Duncan, Senior Agricultural Economist
USDA/Office of Energy Policy and New Uses

The power point slides are in Appendix D and the abstract is in Appendix E.

State of US Food Composting – Institutional and Municipal Scales

Nora Goldstein
BioCycle, The JG Press, Inc.

The power point slides are in Appendix D and the abstract is in Appendix E.

USDA Cafeteria Pilot With Biobased Products

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Beltsville Agricultural Research Center

The power point slides are in Appendix D and the abstract is in Appendix E.

This presentation covers USDA's overall concept and expectations for the pilot, operational strategies, costs, outcomes and lessons learned in the Fall 2005 Biobased Cafeteriaware Project.

This Interagency Pilot Project addressed two recent environmental Executive Orders as well as two legislatively authorized activities under the auspices of the United States Department of Agriculture (USDA) and the U.S. Environmental Protection Agency (EPA). The Pilot Project accomplished its original goals and identified strategic opportunities for advancing the federal biobased procurement program and overcoming the certain challenges for federal facility cafeteria acquisition and use of biobased foodservice-ware and food composting.

The Department of Agriculture's Departmental Administration (DA) was charged by the 2002 Farm Bill to develop an affirmative biobased procurement preference program model. The model must consist of (1) a biobased product preference program; (2) a biobased product procurement promotion program; and (3) an annual review and monitoring of program effectiveness. In addition, the EPA was charged by the Resource Conservation Recovery Act of 1979 with promoting the use of recycled content products including food residuals compost. The two Executive Orders addressed are E.O. 13101, Greening the Government through Waste Prevention, Recycling, and Federal Acquisition; and E.O. 13134, Developing and Promoting Biobased Products and Bioenergy.

On January 10, 2006, USDA completed its Affirmative Procurement Program (APP) and posted it on its biobased website at **http://www.usda.gov/biobased**. The APP formally establishes USDA's Biobased Procurement Program for USDA-designated biobased items and provides agency-wide guidance for implementing an effective program. USDA's Biobased APP ensures items composed of biobased material will be purchased to the maximum extent practicable and will serve as the government-wide model to achieve the Section 9002 goals.

USDA-DA's overall plan to fulfill the requirements of the 2002 Farm Bill is to promote the use and procurement of biobased products. An initial step taken by the Department was to conduct this Biobased Pilot Project designed to test biobased/biodegradable food-service products such as cups, plates, cutlery, etc. in the small cafeteria in the Jamie L. Whitten building which serves approximately 2000 patrons per week. The overall goals of the Pilot Project were to demonstrate a full-cycle process for biobased cafeteria-ware by selecting and using it in a cafeteria and then composting the pre-and post-consumer food residuals. The compost byproduct would then be used in the USDA Whitten Building gardens. Specific objectives of the project included the following:

* Select and use biobased food service-ware in the Whitten Building employee cafeteria;
* Evaluate customer acceptance and satisfaction with the biobased food service-ware;
* Educate staff and customers about the program and evaluate compliance with source separation;
* Evaluate compostability of the food service-ware;
* Characterize and use the compost produced in the Whitten building gardens in 2006;
* Assess the feasibility of expanding the program to the main cafeteria; and,
* Assess the feasibility and identify resources needed to include other federal agencies in the program.

The full-cycle approach of the Pilot Project included: (1) a 100 percent replacement of current Styrofoam and plastic food service items with biobased products wherever possible; (2) data collection from cafeteria patrons' comments on a daily basis; (3) partnering with the Agricultural Research Service's (ARS) Beltsville Agricultural Research Center (BARC) and the Environmental Protection Agency (EPA) to provide training to patrons on how to dispose of waste to prevent contamination with noncompostables and to compost the cafeteria residuals; (4) collecting biobased product and food residuals on a daily basis, and in collaboration with ARS/BARC transporting and composting it at the USDA/ARS BARC composting facility in Beltsville, Maryland, and evaluating its compostability; (5) use of the finished compost in the Whitten Building gardens; and (6) diverting cafeteria-derived organic recyclables from landfill disposal to a beneficial horticultural use.

This three month Pilot Project provided the project team with a reasonable scale operation that allowed for quick identification of problems and ability to correct them. It also served as a live demonstration project that permitted the DA to test the effectiveness of the products and to determine patron acceptability of biobased, biodegradable food service products such as cups, plates, and cutlery and compliance with a source-separation disposal program, as well as final compostability.

To educate staff and patrons about the reasons and benefits of the Pilot Project and make them aware of the biobased procurement program, DA collaborated with BARC and EPA to provide training to patrons on which receptacles to use for which items to prevent contamination from entering the compostable stream. The training became an integral part of the pilot and was conspicuously located just outside of the Whitten Cafeteria for the duration of the Pilot. It included (1) a PowerPoint presentation about the biodegradability of the biobased materials and on the separation of items for later composting; (2) an information visual display that compared the lifecycle of Styrofoam and plastic to that of the biobased materials was placed outside the cafeteria; and (3) brochures on biobased awareness and composting, along with sample materials, were provided to patrons.

During the Pilot, 33,426 patrons were served. In general, patrons initially accepted the change from the typical Styrofoam and plastic ware to products manufactured from biobased feedstock with little apprehension. Acceptability of the products increased the longer the Pilot was sustained. However, as expected there were those patrons that did not like or appreciate the change. Out of over 33,000 patrons served fewer than 150 negative comments were received. They ran the gamut from disliking the products because they were so different from what was normally expected, to cups that were used for hot liquids becoming too hot to hold and cornstarch straws breaking. As a rule, the comments were minor in nature and did not indicate any serious issues that would call for the discontinuance of the use of biobased products.

Throughout the Pilot, cafeteria operations and services were not adversely impacted by the change to biobased products. Kitchen staff compliance with source separation was excellent.

Biobased products for the Pilot cost $14,367.42 with total freight charges of $952.83. USDA's part of the overall cost was 66% or $9482.50 and the cafeteria contractor's portion was 33% or $4884.92. This represents an appreciable increase over the normal cost of doing business with the typical Styrofoam and plastic cafeteria-ware. However, such an increase in cost is typical, when an industry is in its infancy because the small number of manufacturers available will reduce the potential for competition. As the Pilot continued, an increase in the availability of biobased service-ware was noticed. An increased number of companies began to call the project manager for information on how to become involved with the existing or future pilots that USDA would conduct using biobased cafeteria-ware. As the number of manufacturers of these items increases, so too will competition; thereby, the cost of doing business will decrease.

The pilot included a wide variety of biobased products (Table 1). These included biodegradable bowls, plates, cups, food containers, knives, forks, spoons, straws, and some lids. Only a few lids and a water cup are not currently available as biobased or biodegradable products. These products, along with the food preparation scraps and trimmings, as well as the source-separated post-consumer residuals from the cafeteria, were composted at the BARC Composting Research Facility. The total composting effort included:

* 11,370 pounds of compostable cafeteria materials, (10, 945 pounds of kitchen trimmings and 435 pounds of biobased products); and,
* 168 cubic yards of leaves and grass.

A significant fact concerning the composting activity deals with the trace amount of plastic contaminants recovered from the compostables in the post-consumer collection bins. Out of the total amount of materials used for composting only 20 pounds or 0.18 % of non-compostable plastics were recovered. For a diminutive amount of contaminants of this nature to be found in such an activity as composting is very unique. So unique in fact that it can only be attributed to the quality and level of education and guidance provided to cafeteria patrons by BARC, EPA, and the cafeteria staff.

The experiment yielded 44 cubic yards of compost that would cost the Department $20 per cubic yard to purchase. The compost will be used at USDA's Whitten Building Demonstration Gardens in the Spring of 2006 at a savings to the Government of $880. In addition to the monetary savings that will be realized, the use of composted biobased products will introduce considerable intrinsic value into the environment.

Lesson's learned by USDA are many. However, the most significant include the following:

1. Biobased products are difficult to find but this will be overcome, based on feedback that we have received from the industry;
2. Biobased cafeteria-ware currently cost more than conventional cafeteria-ware; however, as more producers and dealers are found, competition will increase and overall costs will be reduced;
3, Good planning, quality awareness training, constant communications, superior teamwork and management backing are essential to a successful program; and,
4. Composting of the full range of pre-and post-consumer cafeteria residuals not only reduces the amount of material sent to landfill, and the costs associated with that, but also provides a product for landscaping of federal building that would otherwise have to be purchased.

During the 3-month Pilot, the Whitten cafeteria did not contribute any Styrofoam or plastic cafeteria waste to landfills, which takes hundreds of years to decompose. If this effort were replicated throughout the government, or even just within the Washington Metropolitan area, it would considerably reduce the total amount of material being landfilled by the Federal government.

Interagency collaboration was key to accomplishing Project objectives. The DA, through its Office of Procurement and Property Management, and Office of Operations, identified sources and obtained the biobased service-ware, identified a suitable size cafeteria space for the project, coordinated with the foodservice contractor to make necessary changes during the contract period, and provide daily oversight to the Project. The ARS-Beltsville Composting Research Facility and EPA, Office of Solid Waste, SEA representative Dr. Rosalie Green provided expertise on composting the residuals, as well as education and training of staff and customers, and initial oversight of source separation by staff and customers. ARS and the Cooperative State Research Education, and Extension Service (CSREES) co-organized a one-day Roundtable Discussion "Food and Biobased Cafeteria-ware Composting for Federal Facilities in Washington, DC" in which public, private, non-profit affiliates, biopolymer, compost, and other experts discussed strategies for overcoming various limitations to moving the Pilot Project model to the next level of implementation. A written proceedings of the Roundtable will be posted on the web and made available in limited hardcopy.

USDA and EPA consider the Pilot a complete success and that the use of Biobased products is the future. As the biobased program grows, the reduction in waste generation becomes more significant; the use of foreign petrochemicals becomes less necessary; and the need for greater quantities of agricultural feedstocks will increase as a result of increase production and demand for biobased products.

The knowledge and experience gained from the pilot provided the necessary base from which to recommend that management consider the full integration of biobased food service products into all of USDA's cafeterias and at Forest Service feeding sites during fire season. Additionally, DA has submitted a Sources Sought request for biobased cafeteria service-ware to FedBizOps to identify greater numbers of companies that can provide quality biobased service-ware, thus reducing overall costs through greater competition. These companies, along with others that may come online, will be included in USDA's overall strategy for the re-competition for cafeteria services in FY 2007.

Table 1. Items Used in the 2005 USDA Whitten Cafeteria Biobased Product Pilot Project

Item Description	Agricultural or other feedstock composition/compost claim
7" Sturdy Bagasse Plates	Sugarcane, composts in 45 days
9" Sturdy Bagasse Plates	Sugarcane, composts in 45 days
12 oz Cold Cup	Corn, composts in 45 days
20 oz Cold Cup	Corn, composts in 45 days
24 oz Cold Cup	Corn, composts in 45 days
Flat Lid with Straw Slot for 12/20 oz - Made from Corn	Corn, composts in 45 days
Flat Lid with Straw Slot for 24 oz - Made from Corn	Corn, composts in 45 days
9" x 12" Tray - 99.9% Recycled Content - Biodegradable	Recycled paper, composts in 60 days
2-Cup Carrier - Recycled - Biodegradable	Recycled paper, composts in 60 days
12 oz Bagasse Bowl	Sugarcane, composts in 45 days
32 oz Clear Cylinder Food Container - No Hot Foods	Corn, composts in 45 days
16 oz Hot Food Container - 99.9% Recycled Content	Recycled paper
12 oz Hot Food Container - 99.9% Recycled Content	Recycled paper
8 oz Hot Food Container - 99.9% Recycled Content	Recycled paper
16 oz Clear Cylinder Food Container - No Hot Foods	Corn, composts in 45 days
8 oz Clear Cylinder Food Container - No Hot Foods	Corn, composts in 45 days
Lid for Clear Cylinder Food Container	Corn, composts in 45 days
12 oz Bio-Coated Hot Cup - Biodegradable	Recycled paper, vegetable-based coating, composts in 60 days
16 oz Bio-Coated Hot Cup - Biodegradable	Recycled paper, vegetable-based coating, composts in 60 days
Hot Cup Jacket - Recycled - Biodegradable	Recycled paper, composts in 60 days
12 oz Recyclable Plastic Water Cup	Plastic, not compostable (see 12 oz corn cup)
8" Thin Straw	Corn, composts in 45 days
Corn Fork - Not for Hot Food	Corn, composts in 45 days
Fork - Heat-stable	Plant cellulose and limestone, composts in 120 days
Corn Spoon - Not for Hot Food	Corn, composts in 45 days
Spoon - Heat-stable	Plant cellulose and limestone, composts in 120 days
Corn Knife - Not for Hot Food	Corn, composts in 45 days
Knife - Heat-Stable	Plant cellulose and limestone, composts in 120 days
Plastic Lid for 16 oz Hot Food Container	Plastic, not compostable
Plastic Lid for 8/12 oz Hot Food Container	Plastic, not compostable
Black Plastic Lid for 16 oz Bio-Coated Hot Cup	Plastic, not compostable

Case Studies: Keys to Successful Large Institutional and Municipal-Scale Food Composting

Keys to Success of San Francisco Food Composting & Compostable Product Ware Use

Jack Macy
Commercial Recycling Coordinator, SF Environment
City and County of San Francisco

The power point slides are in Appendix D and the abstract is in Appendix E.

Case Studies: Keys to Successful Large Institutional and Municipal-Scale Food Composting

In-Vessel Composting: The Wright Way

Bob Kerlinger, President
Mid-Atlantic Composting Association

The abstract is in Appendix E.

In-Vessel Systems, City of Hutchinson, MN, & Schools

Jim McNelly, President
Renewable Carbon Management

The power point slides are in Appendix D and the abstract is in Appendix E.

An Economic Analysis of Composting

Nadine H. Davitt
Organic Materials Processing and Education Center
The Pennsylvania State University

The power point slides are in Appendix D and the abstract is in Appendix E.

New York State Correctional Facilities Composting Operations

James I. Marion
Resource Management Director
NYS DOCS

The abstract is in Appendix E.

Rationale and Scope

The New York State Department of Correctional Services is the third largest State correctional system in the nation with 70 correctional facilities housing approximately 63,000 inmates supervised by 29,000 civilian and security staff. Correctional facilities range from 200 bed minimum security work camps and shock incarceration units to large 1930's era maximum security walled facilities such as Sing Sing and Attica with up to 3300 inmates. The majority of inmates, 39,000, are housed in medium and minimum security dormitory style units with up to 1500 beds.

Feeding systems range from traditional mess halls with cafeteria style service to small group satellite feeding units. Nearly 6,000 inmates are fed three meals daily in their cells, medical units or 23 hour per day isolation cells.

With the passage of the Solid Waste Management Act of 1988 all State divisions were required to initiate solid waste management and recycling policies to be in place by January 1991. The Department of Correctional Services responded by creating the Resource Management Division in 1990 to reduce the waste stream and provide avoided disposal costs to cover the cost of operations.

Today the Department maintains recycling programs in all 70 facilities with 12 regional processing centers marketing over twenty recycled commodities in commercial load lots.

Early waste audits revealed the largest fraction of the waste stream by weight was food preparation waste and leftovers. Food waste generated weighed 1800 pounds per cubic yard with an average of 1 pound per day generated per inmate. This number is representative of audits conducted in 16 other States and compares with over two pounds per bed in hospitals and up to 3 pounds per bed in nursing homes. It was determined that less than .25 pound per day was coming from returned serving plates with the balance coming from food prep areas, over-date bakery and wet materials such as pasta, rice, coffee grounds and soups.

In 1990 two pilot compost sites were developed to refine collection protocol and compost process control as well as determine economic feasibility for expanded operations. These early sites were open windrows on impervious pads utilizing large wood chips as a bulking agent and carbon source.

Based on results of pilot sites from operational and avoided cost perspectives the program has expanded to 32 compost facilities processing organic waste from 56 correctional facilities. During Fiscal Year 2005-06 approximately 14,000 tons of food waste and waste wood will be composted. Using $130 per ton as an average waste disposal cost (tipping and hauling fees)

the avoided cost will be $2.2 million. This number includes avoided disposal costs for composting of approximately 100 dairy cattle and calf mortalities and abattoir waste from 500 beef animals processed in the Department's Agri-Business program.

Operational Protocol

Although a number of composting technologies are in place in the New York system a set of standard separation, collection and process protocols have become implemented at all composting facilities.

Food waste is collected in unlined, covered, plastic barrels (35 gallon) from pre and post consumer areas of facilities. All paper and plastics are rigidly source separated

Generally inmates are served in Lexan sectioned trays using durable drinking vessels and metal cutlery. Inmates housed in remote areas or segregated cells are served in covered Lexan trays and portion controlled foil sealed polystyrene containers. In emergency situations and facility lock downs inmates may be fed in their cells in Styrofoam containers with disposable cutlery.

Collected food waste barrels are moved daily to compost facilities or in some facilities stored in dedicated coolers for thrice weekly collection. No size reduction or grinding is utilized at any facility.

On site mixing of food waste with bulking agent is accomplished by skid steer or front loaders in one half of windrow sites or in scaled agricultural feed mixers. Aerated bay and in-vessel sites all utilize scaled mixers. Bulking agent is exclusively tub ground scrap wood generated at correctional facilities from routine maintenance, pallets, clean construction debris, lawn and tree waste. In-vessel systems require double ground mulch material also generated on site by private vendors semi- annually. At several sites lawn and tree waste is accepted from local municipalities as well as utility generated chipped material. Starting recipes are generally 2:1 by volume bulking to food. Mixing tables by weight are used in mechanical mixing sites.

Composting temperatures are maintained at 55 – 70 °C. for approximately 30 days. Daily temperature readings determine turning and aeration activities. Initial moisture content is routinely 60 % for windrows and 65-70 % for mechanically aerated systems. Experience shows that visible food waste is gone in 2-3 weeks, with material ready for screening and curing in 4-5 weeks. Material is removed from active aeration and turning based on return to near-ambient temperature, moisture content and physical appearance.

Routine maturity testing is done semi-annually with complete physical and chemical analysis done only when a significant change in feedstock is experienced. Base recipes and time protocols were developed based on 2 years of quarterly analysis conducted for each technology.

All compost is routinely screened through 3/8" trommel or orbital screens. Overs are returned to the compost cycle after contaminants are hand removed. Fines are cured with minimal management for at least 90 days with 120 days being the average.

Mature compost is utilized within the correctional system for landscaping, vocational horticulture programs, community service projects and in some cases land applied for turf maintenance or agricultural land amendment. Increasingly finished compost is bartered to State and local transportation departments and municipalities for in-kind services. Limited bulk sales to private vendors are completed when surpluses develop at selected sites.

Technology

Site constraints include available space, visual buffers, quantity of generation, leachate treatment options and available labor. These constraints are used to determine the level of technology utilized in developing compost facilities. Economic payback analysis also plays a major role in system implementation. Facilities are generally constructed that will provide an avoided disposal cost amortization in less than 5 years. The exception to this rule is when an in-vessel system is indicated where payback is less than 10 years.

Four levels of technology are employed at correctional sites. At present 17 open windrow, 6 structure covered windrow, 5 aerated bay and 4 in-vessel systems are in use. An additional 3 aerated bay facilities are funded or in development. The operating policy calls for implementing the lowest effective technology.

Leachate treatment at sites is accomplished through capture of site runoff in surface drains and underground settling tanks that are pumped for landfill disposal as needed. The liquid fraction of runoff is diverted to stone filled recharge structures and grass filter strips designed by USDA-NRCS.

Each level of technology offers advantages and challenges.

Open windrows

Traditional open windows on an impervious pad, usually concrete, is the most economical system to construct and operate. These facilities are capable of handling large quantities of material with great flexibility for active processing, bulk storage and curing. Process control is limited by precipitation, temperature and other environmental influences. Mixing is less precise unless an ancillary mixer is used. Maintaining appropriate moisture has been problematic in some instances. This method is used for very large sites with a variety of feedstocks such as manures, food and mortalities with discrete windrows on the same site. This method is also used for very small operations where capital costs for benefit derived are marginal. Leachate collection and treatment must be sized to accommodate rain and snow drainage from pad areas.

Open windrows are used for curing at most sites even with enclosed active composting areas.

A 2002 study using prevailing civilian wages and current construction costs indicated open windrows operated with costs in the $6.00 per ton range.

Covered windrow

Windrow operations covered by pole structures with open or partial side walls are used where visual considerations are a consideration. The structures also provide increased process control in high precipitation and severe winter sites. Containment of compost materials to the pad area is also improved with partial concrete sidewalls. Large pole structures can also provide elemental protection for equipment such as mixers and screens. Pole structures are normally 60' wide by up to 200' long.

Operational challenges with a covered windrow system include adequate ventilation for water vapor, building maintenance from equipment damage and interior odor issues.

In the New York experience based on 2002 information costs per ton of material composted was in the \$12 - \$15 per ton range.

Aerated Bay

Aerated static bay systems offer several process control advantages such as absolute temperature and moisture control with forced aeration. Aerated bay facilities are relatively labor efficient since regular turning of windrows is not required and they are very space efficient for material processed. Because of the improved process control, thermophilic stages can be reduced to the minimum time frame.

Aerated bay systems however require additional equipment in mixers, scales, screens and aeration fans and controls with inherent maintenance costs. As with any enclosed composting space, ventilation is critical to the success of the program. Aerated bay systems also lose flexibility in recipes and variation in feedstock although not as restrictive as in-vessel systems.

It is the New York State experience that most new composting facilities will be of the aerated bay type based on cost efficiency, space, aesthetic parameters and process control.

Aerated bay systems are in the \$20.00-25.00 cost per ton range when amortized over 10 years.

In-Vessel

While the most costly on a per ton processed basis in-vessel composting systems still provide reasonable returns in specific site locations. The New York State DOCS operates 4 Wright Environmental units of 750, 1500, 2000 and 3000 pounds per day capacity. These units are employed where space is at a premium such as inside facility security perimeters and adjacent to other inhabited buildings. In-vessel units provide ultimate process control and protection from the elements. Aeration, moisture, mixing and leachate control are integrated in the vessel. With a 20' by 60' footprint the 3000 pound per day unit is very space efficient. On board leachate recycling and a bio-filter make these units neighbor friendly.

Management considerations are increased for in-vessel systems. Integrated computers and electronics require extensive operator training and increased maintenance costs when mechanical failures occur. Enclosed space regulations may make routine maintenance difficult. In-vessel systems are recipe specific and require specialized bulking material with little flexibility in feedstock. With an enclosed tunnel design adjustments to material in the 14 day cycle are difficult.

In-vessel systems have been very successful in the NYS system and over a 15 year amortization capital and operational costs average $45.00 per ton

All the above described composting technologies are capable of producing commercially acceptable compost products and significant waste disposal cost avoidance when compared to an average $130.00 per ton hauling and landfill fee structure.

Biobased Product Experience

Since 1995 the New York State DOCS has piloted 3 brands of biobased food service ware and bags. All of these products were vegetable starch based with bag products including a polyethylene matrix. In each case a number of economic and physical characteristics precluded the Department from regular use of the products.

The NYS DOCS potential use of disposable/compostable service ware is limited to emergency and security issue cell based feeding situations.

The most evident limiting factor in each of the product lines tested was cost per service. The minimum cost was more than double the cost of alternative materials such as foam or paper materials.

Waste Bags

In the case of compostable bag products to be used as food waste can liners no product exhibited abrasion resistance suitable for institutional use. No product tested provided thermal tolerance above 100^0F without failure. All but one product tested also lost integrity in the presence of high moisture materials when stored for more than a few minutes.

When introduced in windrow composting biobased bags disintegrated into large fragments that posed a severe airborne problem across the landscape. When used in mixing equipment bag sections became entangled in shafts and elevators causing system failures. Un-degraded bag fragments also coated the interior of screening equipment causing poor sizing of materials.

As with all tested biobased products the per unit cost of bio-degrable waste bags was approximately double that of traditional film bags.

Service Ware

Product testing for biobased service ware included cups, bowls, plates and cutlery. All products tested were of vegetable starch compounds.

In each case of products submitted for field testing, both physical and economic limitations prohibited inclusion of these products in regular use for correctional facilities.

In all cases, cups, bowls and plates did not sustain physical shape or integrity when exposed to normal serving temperature foods or liquids. When stored in unventilated areas ambient heat of summer caused disfiguring and self adherence.

Forks and spoons did not maintain rigidity when introduced to hot liquids and became misshapen when stored in summer temperatures. When utensils stored for over 60 days were used they became brittle and broke into small pieces especially knives.

When biobased cutlery was introduced to the compost process handle areas showed an uncanny resistance to degradation and after several months became a contaminant of increasing proportions in recovered bulking agent. It was noted that a significant portion of biobased cutlery was still evident in compost after 4 cycles of active composting. The biobased materials were tested in all four compost systems in use.

As with biobased film products, the cost of cutlery was at least double of durable and disposable plastic and metal alternatives.

Although initial experiences with biobased service ware were unsatisfactory the NYS DOCS system would continue to field test new products as the utility and environmental advantages of biobased products could fill a need in selected instances.

Biobased Product Development, Supply, and Procurement: Meeting Quality Standards and Product Demand

Panel: Industry Perspectives: Ways to Move Forward

Biobased Products: Opportunities and Issues for Growth

Steven A. Mojo, Executive Director
Biodegradable Products Institute

The power point slides are in Appendix D and the abstract is in Appendix E.

Earthshell

John Nevling
Earthshell Corporation

and

Cindy Eikenberg
Marketing Communications Manager
Earthshell Corporation

The power point slides are in Appendix D and the abstract is in Appendix E.

Biodegradable Products and Solid Organic Waste Management

Li Nie, Sukh Bassi
MGP Ingredients, Inc.

The abstract is in Appendix E.

Summary

MGP ingredients has developed filled composite resins for disposable products for cost reduction, enhanced properties, and enhanced biodegradation. Product applications include films, thermoformed packaging shells and food service trays, and molded articles. We will discuss the benefits of a starch filled system, formulation, properties, composting results and BEES analysis.

Discussion topics are: the market drivers for biodegradable, compostable, bio-based products; solid organic waste management as it relates to biodegradable and compostable plastics; and, the role government plays on waste management and job creation.

The future of biodegradable plastics lies in the direction of solid organic waste management.

Composite resins

MGP Ingredients has developed proprietary technology to make composite starch-polyester compound resins for various products made by injection molding, thermoforming, and film extrusion.

Combining starch with biodegradable polyesters offers following advantages:

1. cost reduction;
2. increased flex modulus;
3. improved heat deflection temperature;
4. enhanced biodegradation;
5. reduced shrinkage and warping;
6. improved molding for better cycle time and release.

For example, at 65% starch in the formulation and assuming a cost of $2.00/lbs of the polyester, the compounded resin cost can be cut in half to $1.0/lb. Table 1 shows the cost analysis for resin at high starch content.

Tensile modulus, in case of Bionolle 1020 (polybutylene succinate), can be doubled as compared to the polyester itself (see Figure 1).

Table 1 Cost Reduction at 65% starch

Poly-ester	starch	Formulation	compounding	Total cost
$2.0/lb	$0.15	$0.82/lb	$0.20/lb	$1.02/lb
$1.0/lb	$0.15	$0.46/lb	$0.20/lb	$0.66/lb
$0.5/lb	$0.15/lb	$0.30/lb	$0.20/lb	$0.5/lb

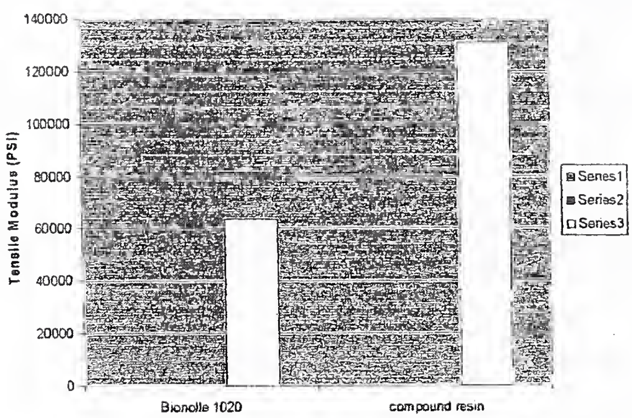

Figure 1 Improvement on Tensile modulus at 65% starch

Starch in the compound resin can be readily digested in a composting environment, leaving behind a matrix with a cell structure for enhanced rate of biodegradation. Enhanced rate of biodegradation is made possible due to a vastly increased surface area. Cutlery products made of the composite resins are compostable according to ASTM D6400.

Products made of such composite resins also have favorable environmental and human health benefits according to the BEES analysis.

Market drivers for biodegradable, compostable, and biobased products

Biodegradability is a material property for many natural and a few synthetic products. A market driver for biodegradable plastics is functional applications requiring biodegradability as a functional property. Good applications examples are golf tees, and lawn netting. The market

for biodegradable products, however, is very small if not tied to solid organic waste management.

Compostability is a defined property of biodegradable materials under the composting environment and an additional requirement for land applications of the resulting composting humus. A market driver for compostable plastics is in solid organic waste management. A good application example is lawn waste composting bags. It will be easier for consumers to mix disposable and compostable plastic products with organic waste without the need to sort them out separately. Solid organic waste recycling can not afford contamination by non-compostable plastic products. B usiness potential is huge when solid organic waste is separated and recycled either by aerobic composting or anaerobic digestion, or a combination of the two.

Biobased products are defined as products containing or derived partially or in full from renewable resources. Market drivers for such products are sustainability for economic viability and a high oil price. As long as the oil price stays high and likely to go higher due to limited availability in the long run, renewable and sustainable resources are attractive for business considerations. Good application examples are ethanol, biodiesel, and plastics such as polylactide (PLA). Such products have to compete with petroleum based products for cost and performance. Even though biodegradability is an intrinsic property of many such products, many products do not necessary compete with petroleum based products on this property.

Biodegradable, compostable, and biobased products are often closely related to each other. There are connections and disconnections. Many biobased products are biodegradable and compostable. Compostable is biodegradable. However, biodegradable is not always compostable. Biodegradable is not necessary biobased. Biobased is not necessary biodegradable. From a business angle, the market driver for each product category is very different.

Solid organic waste recycling

Biodegradable and compostable plastic products are often promoted as a solution to solid waste disposable problems due to concerns of ground contamination, limited availability of space, and cost of landfilling. In reality, there is no need for biodegradable and compostable plastics when there is no solid organic waste management in that regard. Recycling solid organic waste back to the land is a responsible and beneficial practice. It provides the land with needed nutrients and organic humus. Even with solid organic waste recycling, plastics do not have to be biodegradable and compostable if they can be sorted out of the organic waste stream. However, if the mixed plastic products in solid organic waste are biodegradable and compostable, it will provide benefits for ease of handling, sorting and no contamination. Solid organic waste management does not want to see contamination of non-compostable plastic waste. As a result of that, there will be a market demand for such products.

Biodegradable plastic products are often seen for their environmental benefits. However, the consumers are not willing to pay more than 10-15% extra cost. Demand for biodegradable products from solid organic waste recycling will change the perceived benefits into functional requirement. Solid organic waste recycling has the potential to open a huge market for such products.

Aerobic composting and anaerobic digestion

Aerobic composting and anaerobic digestion provide the means to prepare the solid organic waste for recycling back to the land. Composting can result in a good, stable organic humus. Anaerobic digestion can produce methane for energy recovery. By recycling the solid organic waste, a significant portion of the municipal solid waste can be diverted. It reduces the space requirement for landfill and addresses the long term concern about leaching from organic waste fermentation in the mixed waste.

Government's role

With the development and commercial availability of biodegradable and compostable plastics for packaging and disposable products, and the development of composting technology, it is conceivable that solid organic waste can be readily separated from other waste without causing major distress for consumers and institutions. The government will have the goal of mandating consumers, institutions, and industries sort out solid organic waste as part of the recycling program. Burying organic waste with other waste is simply not a sound approach, and will have to be abandoned in the future.

Programs from California on sorting and solid organic waste management such as composting can provide a model for national rollout. Purchasing programs and test programs from government and government cafeterias will also provide incentives for industries, and give insight to move things toward solid organic waste management. Many jobs will be created in an effort to better manage the waste. Industries involved in making biodegradable and compostable plastics, and waste management such as composting will get a boost.

Panel: Customer Perspectives on Biobased Packaging and Cafeteriaware Needs and Opportunities

Army and Navy Environmental Research Programs for the Reduction of Solid Waste

Jo Ann Ratto, Materials Research Engineer
U.S. Army Natick Soldier Center
Nanomaterials Science Team

The abstract is in Appendix E.

Biodegradable/Compostable Plastics

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The abstract is in Appendix E.

Biobased and biodegradable plastics can form the basis for an environmentally preferable, sustainable alternative to current materials based exclusively on petroleum feedstocks. These biobased materials offer value in the sustainability/life-cycle equation by being part of the biological carbon cycle, especially as it relates to carbon-based polymeric materials such as plastics, water soluble polymers and other carbon-based products like lubricants, biodiesel, and detergents. This global carbon cycle vis-à-vis managing carbon efficiently and in an environmentally responsible manner is reviewed by us in earlier papers (1, 2). Identification and quantification of biobased content uses the radioactive C-14 signature.

Biobased polymers are synthesized by many types of living matter - plants, animals and bacteria - and are an integral part of ecosystem function. Because they are synthesized by living matter, biopolymers are generally capable of being utilized by living matter (biodegraded), and so can be disposed in safe and ecologically sound ways through disposal processes (waste management) like composting, soil application, and biological wastewater treatment. Therefore, for single use, short-life, disposable, materials applications like packaging, consumer articles, and food and plasticware, biobased materials can and should be engineered to retain its biodegradability functionality. For durable, long life articles biobased materials needs to be engineered for long-life and performance, and biodegradability may not be an essential criteria.

In this paper we focus on biodegradable/compostable plastics, and review the principles underlying the biodegradability of such plastics under composting conditions (1, 2)

Biodegradable Plastics

Currently, most plastics are designed with limited consideration to its ecological footprint especially as it relates to its ultimate disposability. Of particular concern are plastics used in single-use, disposable packaging and consumer goods. Designing these materials to be biodegradable and ensuring that they end up in an appropriate disposal system is environmentally and ecologically sound. For example, by composting our biodegradable plastic and paper waste along with other "organic" compostable materials like yard, food, and agricultural wastes, we can generate much-needed carbon-rich compost (humic material). Compost amended soil has beneficial effects by increasing soil organic carbon, increasing water and nutrient retention, reducing chemical inputs, and suppressing plant disease. Composting is increasingly a critical element for maintaining the sustainability of our agricultural system. The food wastes along with other biowastes are separately collected and composted to

generate a good, valuable soil amendment that goes back on the farmland to re-initiate the carbon cycle (3, 4).

Polymer materials have been designed in the past to resist degradation. The challenge is to design polymers that have the necessary functionality during use, but destruct under the stimulus of an environmental trigger after use. The trigger could be microbial, hydrolytic or oxidatively susceptible linkage built into the backbone of the polymer, or additives that catalyze a breakdown of the polymer chains in specific environments. More importantly, the breakdown products should not be toxic or persist in the environment, and should be completely assimilated (as food) by soil microorganisms in a defined time frame. In order to ensure market acceptance of biodegradable products, the ultimate biodegradability of these materials in the appropriate waste management infrastructures (more correctly the assimilation/utilization of these materials by the microbial populations present in the disposal infrastructures) in short time frames (one or two growing seasons) needs to be demonstrated beyond doubt.

Polyethylene (PE) or PE-wax coated paper products are problematic in composting because the paper will fully biodegrade under composting conditions, but the PE or wax coating does not biodegrade and builds up in the compost. Paper products coated with fully biodegradable film can provide comparable water resistance, and tear strength like the PE coating. However, it is completely biodegradable and non-interfering in recycling operations (unlike current polytheylene or PE-wax coated paper). These new packaging products along with other biowastes, including food wastes can be collected and composted to generate a good, valuable soil amendment that goes back on the farmland to re-initiate the carbon cycle.

Integration with Disposal Infrastructure

Making or calling a product biodegradable or recyclable has no meaning whatsoever if the product after use by the customer does not end up in a disposal infrastructure that utilizes the biodegradability or recyclability features. Recycling makes sense if the recyclable product can be easily collected and sent to a recycling facility to be transformed into the same or new product. Biodegradable products would make sense if the product after use ends up in a disposal infrastructure that utilizes biodegradation. Composting, waste water/sewage treatment facilities, and managed, biologically active landfills (methane/landfill gas for energy) are established biodegradation infrastructures. Therefore, producing biodegradable plastics using annually renewable biomass feedstocks that generally end up in biodegradation infrastructures like composting is ecologically sound and promotes sustainability. Materials that cannot be recycled or biodegraded can be incinerated with recovery of energy (waste to energy). Landfills are a poor choice as a repository of plastic and organic waste. Today's sanitary landfills are plastic-lined tombs that retard biodegradation because of little or no moisture and negligible microbial activity. Organic waste such as lawn and yard waste, paper, food, biodegradable plastics, and other inert materials should not be entombed in such landfills. Figure 1 illustrates the integration of biodegradable plastics with disposal infrastructures that utilize the biodegradable function of the plastic product.

Amongst disposal options, composting is an environmentally sound approach to transfer biodegradable waste, including the new biodegradable plastics, into useful soil amendment products. Composting is the accelerated degradation of heterogeneous organic matter by a mixed microbial population in a moist, warm, aerobic environment under controlled conditions. Biodegradation of such natural materials will produce valuable compost as the major product,

along with water and carbon dioxide. The CO_2 produced does not contribute to an increase in greenhouse gases because it is already part of the biological carbon cycle. Composting our biowastes not only provides ecologically sound waste disposal but also provides much needed compost to maintain the productivity of our soil and sustainable agriculture. Figure 1 shows disposal infrastructures that can receive biodegradable plastics.

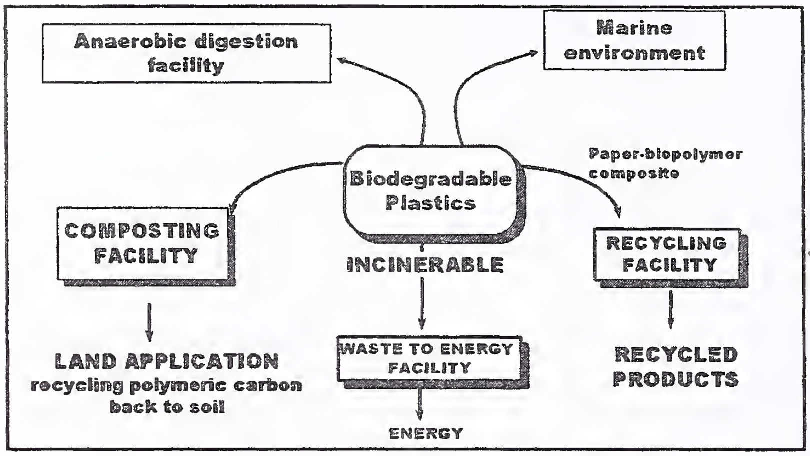

Figure 1. Integration of biodegradable plastics with disposal infrastructures.

As discussed earlier, composting is an important disposal infrastructure because greater than 50% of the municipal soild waste (MSW) stream is biowastes like yard trimmings, food, non-recyclable paper products (see Figure 2)

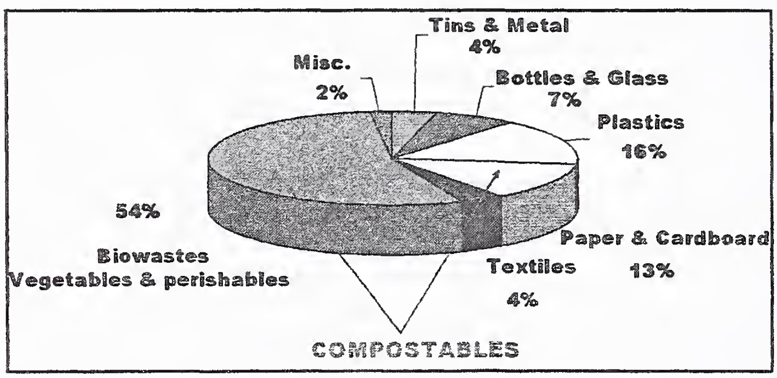

Figure 2. Typical MSW distribution by weight

Degradable vs Biodegradable – An Issue

Designing products to be degradable or partially biodegradable causes irreparable harm to the environment. Degraded products may be invisible to the naked eye. However, out of sight does not make the problem go away. One must ensure complete biodegradability in a short defined time frame (determined by the disposal infrastructure). Typical time frames would be up to one growing season or one year. As discussed earlier the disposal environments are composting, anaerobic digestion, marine/ocean, and soil.

Unfortunately, there are products in the market place that are designed to be degradable, i.e they fragment into smaller pieces and may even degrade to residues invisible to the naked eye. However, there is no data presented to document complete biodegradability within the one growing season/one year time period. It is assumed that the breakdown products will eventually biodegrade. In the meanwhile, these degraded, hydrophobic, high surface area plastic residues migrate into the water table and other compartments of the ecosystem causing irreparable harm to the environment. In a recent Science article (5) researchers report that plastic debris around the globe can erode (degrade) away and end up as microscopic granular or fiber-like fragments, and that these fragments have been steadily accumulating in the oceans. Their experiments show that marine animals consume microscopic bits of plastic, as seen in the digestive tract of an amphipod. The Algalita Marine Research Foundation (6) report that degraded plastic residues can attract and hold hydrophobic elements like PCB and DDT up to one million times background levels. The PCB's and DDT's are at background levels in soil, and diluted out so as to not pose significant risk. However, degradable plastic residues with high surface areas concentrate these highly toxic chemicals, resulting in a toxic time bomb, a poison pill floating in the environment posing serious risks.

Recently, Japanese researchers (7) confirmed these findings. They reported that PCBs, DDE, and nonylphenols (NP) were detected in high concentrations in degraded polypropylene (PP) resin pellets collected from four Japanese coasts. The paper documents that plastic residues function as a transport medium for toxic chemicals in the marine environment.

Therefore, designing hydrophobic polyolefin plastics, like polyethylene (PE) to be degradable, without ensuring that the degraded fragments are completely assimilated by the microbial populations in the disposal infrastructure in a very short time period poses more harm to the environment than if it was not made degradable. These concepts are illustrated in Figure 3. The Figure shows that heat, moisture, sunlight and/or enzymes shorten & weaken polymer chains, resulting in fragmentation of the plastic and some cross-linking creating more intractable persistent residues. It is possible to accelerate the breakdown of the plastics in a controlled fashion to generate these fragments, some of which could be microscopic and invisible to the naked eye, and some elegant chemistry has been done to make this happen.

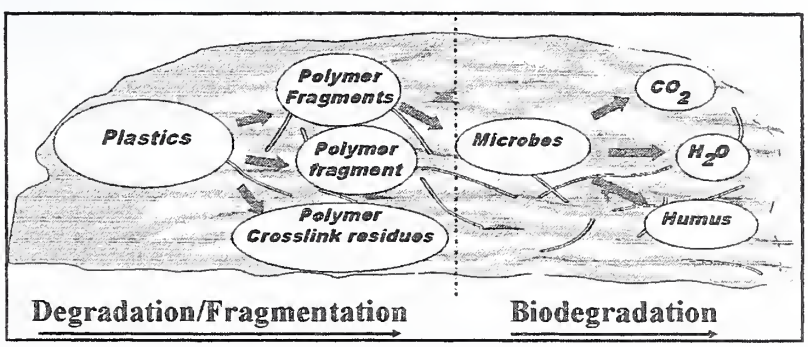

Figure 3. Degradation vs biodegradation

However, this constitutes only degradation/fragmentation, and not biodegradation. As discussed earlier, hydrophobic polymer fragments pose risk to the environment unless the degraded fragments are completely assimilated as food and energy source by the microbial populations present in the disposal system in a very short period (one year). Microorganisms use the

carbon substrates to extract chemical energy for driving their life processes by aerobic oxidation of glucose and other readily utilizable C-substrates as shown by the following equation.

AEROBIC

$$\text{C-substrate} + 6\,O_2 \longrightarrow 6\,CO_2\uparrow + 6\,H_2O;\quad \Delta G^{0'} = -686\ \text{kcal/mol} \qquad \text{Equation 2}$$

$(CH_2O)_x$; $x = 6$

Thus, a measure of the rate and amount of CO_2 evolved in the process is a direct measure of the amount and rate of microbial utilization (biodegradation) of the C-polymer. This forms the basis for ASTM and International Standards for measuring biodegradability or microbial utilization of the test polymer/plastics. Thus, one can measure the rate and extent of biodegradation or microbial utilization of the test plastic material by using it as the sole carbon source in a test system containing a microbially rich matrix like compost in the presence of air and under optimal temperature conditions (preferably at 58^0 C – representing the thermophilic phase). Figure 4 shows a typical graphical output that would be obtained if one were to plot the percent carbon converted to CO_2 as a function of time in days. First, a lag phase during which the microbial population adapts to the available test C-substrate. Then, the biodegradation phase during which the adapted microbial population begins to utilize the carbon substrate for its cellular life processes, as measured by the conversion of the carbon in the test material to CO_2. Finally, the output reaches a plateau when all of the substrate is completely utilized.

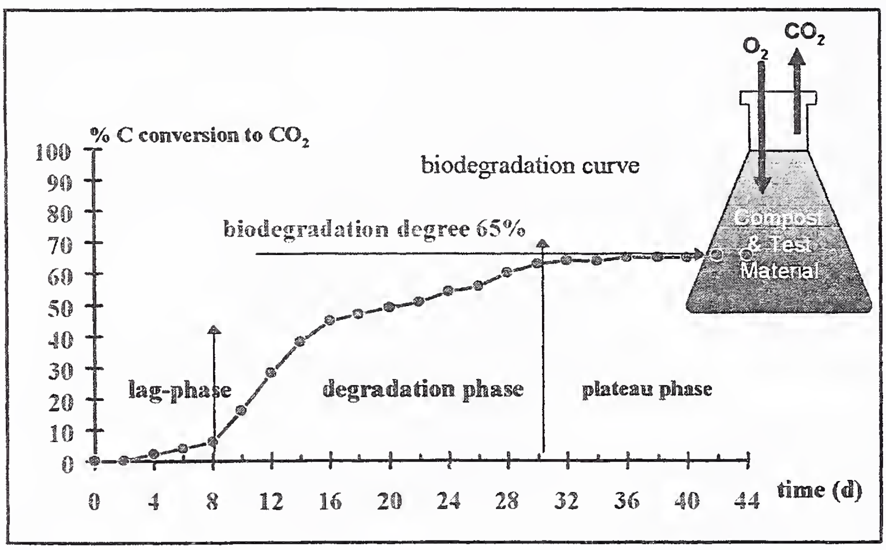

Figure 4. Test method to measure the rate and extent of microbial utilization (biodegradation) of biodegradable plastics

Based on the above concepts, ASTM committee D20.96 (8) has developed a Specification Standard for products claiming to be biodegradable under composting conditions or compostable plastic. The specification standard ASTM D6400 identifies 3 criteria.

Complete biodegradation (using ASTM D5338 test method):

1. Conversion to CO_2, water & biomass via microbial assimilation of the test polymer material in powder, film, or granule form.

2. 60% carbon conversion of the test polymer to CO_2 for homopolymer & 90% carbon conversion to CO_2 for copolymers, polymer blends, and addition of low MW additives or plasticizers.

3. Same rate of biodegradation as natural materials -- leaves, paper, grass & food scraps

4. Time -- 180 days or less; if radiolabeled polymer is used 365 days or less.

Disintegration

<10% of test material on 2mm sieve using the test polymer material in the shape and thickness identical to the product's final intended use – see ISO 16929 (9) and ISO 20200 (10).

Safety

The resultant compost should have no impacts on plants, using OECD Guide 208, Terrestrial Plants, Growth Test.

Regulated (heavy) metals content in the polymer material should be less than 50% of the EPA (USA, Canada) prescribed threshold.

The above specification standard is in harmony with standards in Europe, Japan, Korea, China, and Taiwan, for example EN13432 titled "Requirements for Packaging Recoverable through Composting and Biodegradation—Test Scheme and Evaluation Criteria for the Final Acceptance of Packaging" is the European standard (norm) and similar to D6400. At the International level, the International Standards Organization (ISO) is developing ISO 17088, "Specification for Compostable Plastics" which is in harmony with ASTM D 6400, and the European norms. Figure 5 summarizes the current standards for the different disposal systems.

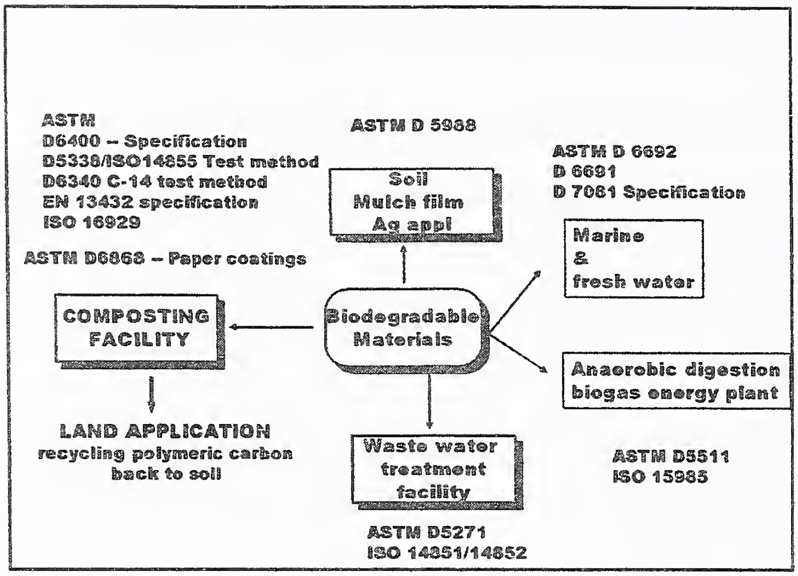

Figure 5. ASTM and European (EN) Standards for biodegradable plastics in different disposal systems.

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10. **International Standards Organization** (ISO) Plastics ISO 202004. Determination of the degree of disintegration of plastic materials under simulated composting conditions in a laboratory-scale test.

Customer Perspectives on Biobased Packaging and Cafeteriaware Needs and Opportunities

Ken Letherer
Whole Foods Market

The power point slides are in Appendix D and the abstract is in Appendix E.

On December 8th, 2005, I had the pleasure of participating in a round table discussion on this topic. This meeting took place at the USDA facility in Beltsville MD. The following is a recap of the discussion.

Our company's goal is to create a full circle waste diversion composting program. We currently have a program in place but would like to divert more landfill products to compost. We currently have our compost bagged and for sale in our retail facilities.

Our company promotes Environmental Stewardship. We see the necessity of active environmental stewardship so that the earth continues to flourish for generations to come. We seek to balance our needs with the needs of the rest of the planet through the following actions:

1. Supporting sustainable agriculture. We are committed to greater production of organically and bio-dynamically grown foods in order to reduce pesticide use and promote soil conservation.

2. Reducing waste and consumption of non-renewable resources. We promote and participate in recycling programs in our communities. We are committed to re-usable packaging, reduced packaging, and water and energy conservation.

3. Encouraging environmentally sound cleaning and store maintenance programs

Company wide we produce and sell a lot of tonnage of prepared foods. We also sell a lot of product in pre-packed plastic containers:

1. We currently have **180 stores** worldwide.

2. Our goal is to have **300 by the year 2010.**

3. **$10 billion in sales** annually by 2010.

4. Worldwide cost of packaging by 2010 will be **$60,000,000.**

Concerns and Challenges:

1. We must be able to leverage our buying power.

2. We have a commitment to not support GMO's into our waste stream or our products.

3. Crop source and true cost matters.

4. Willing to look at reusability that is also compostable.

5. Expense is a huge concern. We must balance all of our stake holder groups being a publicly traded company. This means no premium pricing!

Compostable vs. Biodegradable

1. Most of our stores are on a composting program.

2. Continued challenges in finding haulers and composting facilities in close proximity to all locations.

3. Urban locations are more challenged than suburban.

4. "Biodegradable" claim is like "Natural" claim. It doesn't mean much even if it is true.

5. Some compostable plastics are co-polymers that are blended with hydrocarbons and still get certified compostable.

6. Third party certifiers have symbols that do have some recognition, yet the word compost or compostable probably make the most sense.

7. Using the # 7 triangle symbol for compostable plastic is next to useless. It confuses as much as it clarifies. The number 7 means not the first 6 which are specific hydrocarbon molecules.

How about using the number 0 for compostable plastics that want to use a number. A "0" would imply zero waste.

More Retailing Opportunities

1. In the USA we throw away enough plates and cups to have a picnic for the entire world 6 times a year.

2. Whole Foods Market sells cafeteriaware to our customers every day. We are willing to look into a private brand label for these goods.

3. Other retailers like Wal-Mart, Costco, Harris Teeter etc., are increasingly getting into selling natural and organic products.

In summary, there is a great opportunity to market this program to our customers and the rest of the world if we can procure the product we are looking for. The PLA or plant based material must be made from 100% plant material which would make it fully biodegradable. It must come from a sustainable plant source that is not grown using pesticides of herbicides. It must also not contain any genetically engineered organisms.

Panel: Compost Product Users, Stakeholder Education and Information

What the Horticulture Industry Needs in Regards to Composted Products

Marc Teffeau
Director of Research and Regulatory Affairs
American Nursery and Landscape Association & the Horticultural Research Institute

The abstract is in Appendix E.

Department of Interior's Demonstration Project and Potential Use of Compost by the National Park Service

Heather Davies
Office of Environmental Policy and Compliance
U.S. Department of the Interior

The power point slides are in Appendix D.

Education and Information: Greenscapes, Roof Gardens, Rain Gardens, Compost Berms, Stormwater Management

Rosalie Green
Office of Solid Waste
US Environmental Protection Agency

The abstract is in Appendix E.

Discussion: What will help to increase supply of products and facilitate standards/certification establishment

Summary of Roundtable Discussion Session

Patricia D. Millner, Research Microbiologist
USDA/ARS/BARC/SASL and EMSL

The following is a synthesis of comments and discussion from the open forum that followed the formal presentation session of this Roundtable. The discussion comments have been organized into topics rather than a verbatim record of the statements made.

I. Acquisition of Biobased Food Serviceware

a. Role of the Biobased Product Council USDA-DOE

i. Priorities for performance standards were discussed and members of the Biobased Product Council indicated that they would advocate for promoting adoption of food serviceware standards in the short-term.

ii. It was noted that a number of existing science-based performance tests and approaches have been published and documented. There was consensus among the Roundtable discussion participants, which included members of the Biobased Product Council, that where high quality performance standard tests exist and are already being used by academics and industry these should be considered for use 'as is' or with minor modification.

iii. Performance standards need to build on current practices and standards. There is a significant amount of published and grey literature available documenting current performance testing objectives and protocols. This should be used to the fullest extent possible to accelerate the standards development process. Such testing protocols have been used for biobased serviceware as well as compost.

b. Role of the Office of the Federal Environmental Executive (OFEE)

i. It was explained that among the functions the OFEE can provide are some coordination and liaison efforts relative to a variety of activities and programs underway among different federal agencies. However, procurement is handled by each agency individually. There may be some opportunities to discuss how agencies needs could be better met by promoting economies of scale so that costs/unit item for biobased products can be brought into a more competitive range relative to petroleum-based items during the transitioning phase.

c. Role of Industry

i. Industry representatives in attendance indicated their willingness and desire to work with the federal agencies to provide biobased products. This effort could also include coordinating with the product manufacturers,

Why is this important for historically agriculture based areas? Because more than 20 percent of our citizens have chosen to live in an area that's rural. And the rural rebounds of the 1970s and 1990s showed us that this desire is increasing. Rural areas are perceived as cleaner, safer, and less expensive places to live compared with central cities and suburban areas. Home purchase prices are also perceived to be lower, an important factor when a house has become the primary investment for many families (Daniels, 2000). The preference for rural and small-town residence was an inherent part of the first suburban residential developments, and this preference continues to work in conjunction with the development push to the urban fringe and rural areas (Hayden, 2003).

Social preservationists new to rural areas will engage in action to prevent displacement of old-timers and disruption of community. They are generally well-educated, politically articulate, and not afraid to engage in political practices for preservationist purposes. They patronize established businesses, plan to stay in the community rather than seeking to sell their property at a profit, and desire friendly relationships with old-timers. They also recognize the impact their presence has on the community, including potential negative impact.

Social scientists, not unlike some long-term residents of historically agricultural areas, have confused social preservationists with gentrifiers. This is not only an error, it is a missed opportunity. Social preservationists seek to maintain the culture of the communities where they live. Long-term residents share this goal. But this also presents a problem. While social preservationists are seeking a culture based in agriculture, they have no individual experience of what that means. This presents an opportunity for frame bridging in historically agricultural communities.

Bridging Frames

Frames organize individual experiences and guide individual and collective action. A frame is an ongoing interactive ideology that performs three functions - identification of problems and cause, identification of tactics and strategies, and identification of the reasons for action. (Snow and Benford, 1988). In this case, different groups of local citizens interpret changes in historically agricultural areas differently, identifying the problem and cause, tactics and strategies, and the reasons for action based on their position.

One means of ending frame dispute is bridging the frames that are in dispute. In other words, finding commonalties in interpretation, and beginning the community planning with a holistic and inclusive approach at that point. This means recognizing that there is a point of agreement that can serve as a bridge between different frames. As previously discussed, research in Minnesota and Iowa points to two dominant frames in historically agricultural areas – agribusiness and quality of life. While these frames interpret the situation quite differently, it is interesting to note that preservation of family farming is part of both frames. Both groups feel strongly that family farms are an aspect of rural culture that must be preserved, and both groups identify farming as a source of community identity (although there is disagreement regarding the impact agriculture has on community economy). Interestingly, social preservationists who move to historically agricultural areas will also endorse family farming as a source of community identity. They have moved to the area *because* of the culture, a culture that includes the historical value of family farming.

We know that threats from the outside can increase community cohesion, and when internal cohesion is high, there is an increased likelihood of community action (Coser, 1956). Development pressures that encroach on historically agricultural areas can serve as a means of strengthening communities when frames are bridged between the agribusiness, quality of life, and social preservationist groups. In this way, the perceived external threats can strengthen the group. Internal conflict also has the ability to strengthen the group and clarify group identity. However, when there is not interdependence, internal conflict has the potential to be divisive. By bridging frames at the local level interdependence is increased, decreasing potential for future issues to turn divisive. When frames are effectively bridged we will see communities

work together to address issues of encroachment. Until that point, changes in rural areas will continue to lead to community division - periods of frame dispute – and effective approaches with broad-based community support that address issues of encroachment will not result.

Role of Extension in Social Preservation and Frame Bridging

There is a role for university extension in supporting a holistic planning process to identify interests that includes all stakeholders. In resolving local disputes, it is suggested that extension support a consensus-based process that addresses personal needs, interpersonal relationships, and acceptable products (Fiske, 1991). This is a process that requires extension staff with expertise in social issues, not just those involved in agriculture. (Gray, et al.,1997). To effectively support frame bridging in historically agricultural areas university extension must support and participate in the process that serves the interests of all stakeholders – not just those of the university or those of the agribusiness frame. Perpetuating the present level of divisiveness in rural areas will continue to divide communities and will do nothing to address issues of encroachment. This is the case when university extension acts as an agent of the agribusiness frame. However, as Bachtel (1989) suggests, the future of university extension includes specialists from outside of agriculture – work with communities will require increasing numbers of professionals who understand the dynamics of community and an inclusive, holistic approach.

Working together with a shared vision of the desired future condition, individuals as members of communities can influence the future. This includes the involvement of university extension, including specialists outside of agriculture, as supporters of a holistic, community-based decision making process rather than advocates for university or institutional interests. Rural residents should never be perceived as "passive consumers of broader national change" (Flora, et al., 2004, p. 17)." Rather, they should be looked to as directing the future of their communities if we have any hope of successfully controlling encroachment patterns in historically agricultural areas.

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Finally, process testing during pilot-scale evaluations need to include measures to avoid and reduce nuisance odors, dust, and air emissions that might otherwise impair public acceptance and permitting of such facilities within reasonably close proximity to generation and product user sources. Adverse air impacts, especially odor and dust, in the neighboring communities around composting facilities can be and have been major causes for a facility and operation failure. The success of food recycling and composting programs, which is an essential part of closing the food production and consumption loop, will rely on successful planning and implementation of many steps in the process. The effectiveness of odor containment or reduction will be a significant factor in nearly all urban, suburban, and rural areas. Therefore, designers, planners, and regulators would serve the public need particularly well if they address the odor issue in their project proposals, evaluations, and preparedness plans.

Roundtable Discussion Wrap-up

Food and Biobased Cafeteriaware Composting for Federal Facilities in Washington, DC

Justin R. Barone, Research Scientist
US Department of Agriculture, Agricultural Research Service, ANRI, EMBUL

Introduction

During the Food and Biobased Cafeteriaware Composting for Federal Facilities in Washington, DC Meeting in Beltsville, MD on December 8, 2005, two discussions were held, one centering on the morning session (Pros and Cons In-Vessel, Windrow with Cover, Static Aerated Pile, etc., Composting Options, Debagging and Shredding Options, etc.) and one on the afternoon session (What will help to increase supply of products and facilitate standards/certification establishment?). The following serves as a summary of the approximately one- hour discussions that occurred after each session.

Morning Session: Pros and Cons In-Vessel, Windrow with Cover, Static Aerated Pile, etc., Composting Options, Debagging and Shredding Options, etc.

One large problem facing composting facilities is permitting and regulatory agencies. Specifically, who is a regulatory agency and what restrictions can they impose? Currently, composting facilities can be regulated like waste management facilities because they are viewed as "waste management". This can include regulation at the local, state, and federal levels as well as public comment periods that can delay permitting indefinitely because of NIMBY concerns. One composter in California, Dbest, paid $250,000 for a composting permit. Lawn and leaf composting facilities will typically not take food because the health department may impose regulations over the possibility of pathogens. This is in spite of the fact that compost from food may add value to the lawn and leaf compost. The best solution to this problem is to view composters as biobased product manufacturers instead of waste managers. Quality compost has a high value as a biobased product and different composting sources and techniques offer different products. Compost producers need champions in the federal government who understand the value of composting and compost as a product and can express the need to use quality compost.

A second problem is land costs especially near urban areas. Outside of the costly permitting process in terms of time and money, it may simply be cost-prohibitive to buy land to run a composting facility near large urban areas like Washington, DC. If land costs near urban areas are too high, then how far can a composting facility be from a major urban area before transportation costs make it cost-prohibitive to collect organic and yard waste and compost? In addition, what are the hidden costs of composting?

Emissions from composting facilities are problematic. Typically, there is carbon dioxide, ammonia, and methane from the facility. Talk of emissions occurs concurrently with talk of realistic energy/carbon balances that can take into account all of the biological processes of the plant and all of the biological processes occurring during composting. An important comparison to make would be the carbon balance of a composting facility versus a landfill.

Food based compost has more volatile compounds than lawn and leaf compost, i.e., there is more than 50% mass loss. Food based compost will rapidly degrade into methane. It is known that methane is over twenty times more difficult in producing global warming effects than carbon dioxide. Landfills produce methane that escapes into the atmosphere and landfills are the number one anthropomorphic generator of methane in the country. Landfills are sealed from the surrounding ground. Compost would put carbon back into the soil to be re-used so intuitively a more positive carbon balance over a landfill can be envisioned.

It may be possible to cancel out the carbon dioxide because the compost came from plant matter. Carbon sequestration could be negated by carbon dioxide emission. "Fugitive methane" could be dealt with possibly through trading methane credits. The Chicago Climate Exchange has set a value of $15/dry ton for landfill- or manure-produced fugitive methane. It was suggested that the future of composting would be dependent on trading methane and carbon credits. Some ammonia and methane may be able to be captured and used in fertilizer or energy applications, respectively. New research uncovers new microbial/biological processes that positively affect carbon balances. Although some carbon may be lost through emissions, the carbon that you are putting back into the soil will feed microbes that have longer lifecycles and will stabilize it.

<u>Afternoon Session:</u> What will help to increase supply of products and facilitate standards/certification establishment?

When it comes to non-traditional cafeteriaware, there is much confusion over definitions and content labeling. Eventually, the U.S. government will issue labels on products that meet certain minimum requirements for biobased content. The minimum requirements for various products are a contentious issue. This leads to the definition of "biobased" versus "biodegradable" versus "compostable" versus "recycled". The U.S. government labeling will apparently address minimum biobased or old carbon content. This is not recycled material. Biodegradation can occur on different time scales under different conditions. The Biodegradable Products Institute (BPI) is a trade organization that offers a normalized test for biodegradability for comparison purposes. This is enormously useful for potential users to compare biodegradability of products. Of course, biodegradation will ultimately be based on local conditions where the plastics are used and therefore will degrade on different time scales based on local composting conditions. Not all compost is the same so biodegradation conditions would be different. Professor Ramani Narayan further made the distinction between plastics that simply suffer chain scissioning to short chain polymers or monomers and plastics that degrade to compounds that can be metabolized by bacteria in the environment and converted to carbon dioxide, heat, etc. Only the latter is truly "biodegradable" and "compostable". For packaging applications, "biodegradable" and "compostable" would be advantageous distinctions. However, for many plastics applications, these are not necessarily important and "biobased" content would be more important, i.e., for long-term applications. In the end, the development and use of biobased products is in its infancy and is probably

behaving in a “Moore’s Law”-type manner where new and better products are constantly being developed and introduced to the market place.

It was stressed that producers of biobased products, such as composters or biobased plastics manufacturers, need to stress the “best value” points of their product with procurement agents. In many instances, biobased products may come at an additional initial cost over non-biobased products. Therefore, it is important to stress the advantages of these products and where cost savings may occur downstream or indirectly to offset the initial higher or direct cost.

Currently, there is no mandate to compost organic waste from cafeterias let alone cafeteriaware. Therefore, procurement of biodegradable or compostable cafeteriaware would make more sense if the organic waste that is already a by-product of federal cafeterias was required to be composted. In fact, mandating use of compost by, perhaps, the Department of Transportation, a mechanism for which is already apparently in place, may be a way to use internally generated compost or to increase the market for compost.

APPENDICES

Appendix A

CO-COORDINATORS

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Appendix B

PURPOSES

1. To develop recommendations for appropriate composting technology and support operations options for large institutional-, metropolitan-, and regional scale food composting.

2. To advance the use of biobased cafeteriaware by federal facilities.

3. To promote the support of biobased cafeteriaware for the Federal Biobased Procurement Program.

4. To advance the adoption of compost quality and testing standards for Federal procurement programs (i.e., define compost and quality assurance standards).

Appendix C

PROGRAM PLUS SPEAKER CONTACT INFORMATION

FOOD AND BIOBASED CAFETERIAWARE COMPOSTING FOR FEDERAL FACILITIES IN WDC

Roundtable Discussion

December 8, 2005

USDA, ARS, Henry A. Wallace Research Center
10300 Baltimore Ave.,
Building 005, Conference Room 21
Beltsville, MD 20705

Moderator:

Richard Reynnells, National Program Leader
US Department of Agriculture, Cooperative State Research, Education, and Extension Service
800 9th St., SW, RM 3140 Waterfront Centre
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email: rreynnells@csrees.usda.gov

8:00 – 8:05

Welcome and Organizational Comments
Richard Reynnells, National Program Leader
US Department of Agriculture, Cooperative State Research, Education, and Extension Service

Ronald Korcak, Associate Area Director
Beltsville Area Director's Office
US Department of Agriculture, Agricultural Research Service.
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8:05 – 8:10	**Charge to the Roundtable Participants** Patricia D. Millner, Research Microbiologist US Department of Agriculture, Agricultural Research Service Sustainable Agricultural Systems Laboratory and Environmental Microbial Safety Laboratory Beltsville Agricultural Research Center 10300 Baltimore Ave, Bldg. 001, Rm 140 Beltsville, MD 20705 T#: 301-504-8387 F#: 301-504-8370 email: millnerp@ba.ars.usda.gov
8:10 – 8:30	**Federal Biobased Products Procurement Program – Status of Cafeteria-ware and Compost** Marvin Duncan, Senior Agricultural Economist Office of Energy Policy and New Uses US Department of Agriculture Room 4059 South Building 1400 Independence Ave. SW, MS-3815 Washington, DC 20250-3815 T#: 202-401-0532 F#: Email: mduncan@oce.usda.gov
8:30 – 8:50	**State of US Food Composting – Institutional and Municipal Scales** Nora Goldstein BioCycle, The JG Press, Inc. 419 State Avenue Emmaus, PA 18049 T#: 610-967-4135 ex26 F#: 610-967-1345 Email: noragold@jgpress.com
8:50 – 9:15	**USDA Whitten Cafeteria Pilot Program with Biobased Products** J. Mike Green, Program Manager, Biobased Procurement US Department of Agriculture, OPPM Reporters Building, Room 342 300 7th Street, S.W. Washington, DC 20024 T#: 202.720.7921 F#: 202.720.8972 Email: mike.green@usda.gov Patricia D. Millner, Research Microbiologist US Department of Agriculture, Agricultural Research Service Beltsville Agricultural Research Center

Rosalie E. Green, Senior Recycling Specialist
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109 Kent Drive
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Randy Townsend
US Department of Agriculture, Agricultural Research Service, Beltsville Agricultural Research Center
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Beltsville, MD 20705
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Case Studies: Keys to Successful Large Institutional and Municipal-Scale Food Composting

9:15 – 9:45 **Keys to Success of San Francisco Food Composting & Compostable Product Ware Use**
Jack Macy, Commercial Recycling Coordinator
Department of the Environment
City and County of San Francisco
11 Grove Street
San Francisco, CA 94102
T#: 415.355.3751
F#: 415.554.6393
Email: jack.macy@sfgov.org; www.sfenvironment.org

9:45 10:00 **In-Vessel Composting: The Wright Way**
Bob Kerlinger, President
Mid-Atlantic Composting Association
20 Roberts Landing Drive
Poquoson, VA 23662
Cell#: 757.254.3289
T#: 757.868.3779
F#: n/a
Email: bkerlinger@widomaker.com

10:00 – 10:15 **BREAK**

10:15 – 10:30 **In-Vessel Systems, City of Hutchinson, MN, & Schools**
Jim McNelly, President
Renewable Carbon Management
44 28th Ave. North, Suite J
St. Cloud, MN 56303
T#: 320-253-5076; Cell T#: 320-253-4976
F#: 320-492-5076
Email: rcm@composter.com

10:30 – 10:45	**An Economic Analysis of Composting** Nadine H. Davitt 0248 Ag Engr Building The Pennsylvania State University University Park, PA 16802 T#: 814.865.6606 F#: Email: njh103@psu.edu; njh103@engr.psu.edu
10:45 - 11:00	**New York Correctional Facilities, Food Composting Operations** James Marion, Resource Management Director Eastern Correctional Facility Division of Agribusiness 553 Berme Road Napanoch, NY 12458 T#: 845.647.1653 F#: Email: jimdocs@pronetisp.net
11:00 - 12:00	**Discussion: Pros & Cons** **In-Vessel, Windrow with cover, Static Aerated Pile, etc Composting Options, Debagging and Shredding Options, etc.**
12:00 – 12:30	**LUNCH (on-site)**

Biobased Products Development, Supply, and Procurement: Meeting Quality Standards and Product Demand

12:30 – 1:15	**Panel: Industry Perspectives: Ways to Move Forward**
12:30 - 12:45	**Biobased Products: Opportunities and Issues for Growth** Steve Mojo Biodegradable Products Institute 331 West 57th Street, Suite 415 New York, NY 10019 T#: 1-888-BPI-LOGO (274-5646) F#: 973.916.1911 Email: smojo@galatech.org; info@bpiworld.org
2:45 - 1:00	**Earthshell** John Nevling Earthshell Corporation Cindy Eikenberg, Marketing Communications Manager 1301 York Road, Suite 200 Lutherville, MD 21093-6005 T#: 410.847.9420 Ext. 13 F#: 410.847.9431 Email: ceikenberg@earthshell.com; www.earthshell.com

1:00 - 1:15 **Biodegradable Cutlery Products and the True Composting Link**

Li Nie
MGP Ingredients, Inc.
1300 Main Street
PO Box 130
Atchison, KS 66002
T#: 913.360.5246
F#: 913.360.5746
Email: li.nie@mgpingredients.com

1:15 – 2:00 **Panel: Customer Perspectives on Biobased Packaging and Cafeteriaware Needs and Opportunities**

Army and Navy Environmental Research Programs for the Reduction of Solid Waste

Jo Ann Ratto, Materials Research Engineer
U.S. Army Natick Soldier Center
Nanomaterials Science Team
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T#: 508.233.5315
F#: 508.233.5363
Email: Joann.Ratto.Ross@us.army.mil

Biodegradable/Compostable Plastics

Ramani Narayan
Professor of Chemical & Biochemical Engineering
Department of Chemical Engineering & Materials Science
2527 Engineering Building
Michigan State University
East Lansing, MI 48824
T#: 517.432.0775
F#: 517.
Email: narayan@msu.edu

Customer Perspectives on Biobased Packaging and Cafeteriaware Needs and Opportunities

Ken Letherer
Whole Foods
2001 Pennsylvannia Ave.
Philadelphia, PA 19130
T#: 215-266-3540
Email: Ken.Letherer@wholefoods.com

2:00 – 2:15 **BREAK**

2:15 – 3:00 **Panel: Compost Product Users, Stakeholder Education and Information**

Marc Teffeau
American Nursery & Landscapers Assoc.
1000 Vermont Ave. NW, Suite 300
Washington, D.C. 20005-4914
T#: 202-789-2900
F#:
Email: mteffeau@anla.org

Department of Interior's Demonstration Project and Potential Use of Compost by the National Park Service

Heather Davies
Office of Environmental Policy and Compliance
U.S. Department of the Interior
1849 C Street, NW (MS 2340)
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Education and Information: Greenscapes, Roof Gardens, Rain Gardens, Compost Berms, Stormwater Management

Rosalie Green
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US Environmental Protection Agency
109 Kent Drive
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2:45 – 3:45 **Discussion: What will help to increase supply of products and facilitate standards/certification establishment**

3:45 – 4:00 **Roundtable Wrap-up**

Justin R. Barone, Research Scientist
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Appendix D

POWER POINT PRESENTATIONS

Slides were converted to black and white format for the proceedings, but some pictures and information did not photocopy clearly.. Contact the author for the original power point slides.

Provisions Of The Federal Biobased Products Preferred Procurement Program And Progress In Implementation

Marvin Duncan
USDA

A STATUS REPORT ON THE PREFERRED PROCUREMENT PROGRAM FOR BIOBASED PRODUCTS

Food And Biobased Cafeteriaware Composting Round Table
Thursday, December 8, 2005
Beltsville, Maryland

Dr. Marvin Duncan
Senior Agricultural Economist
USDA/Office of the Chief Economist/Office of Energy Policy and New Uses

FEDERAL BIOBASED PRODUCTS PREFERRED PROCUREMENT PROGRAM

- Provides that Federal agencies must purchase biobased products designated by this program
- Authority for the program included in the Farm Security and Rural Investment Act (FSRIA) of 2002

SECTION 9002 OF FSRIA SETS OUT FEDERAL AGENCY REQUIREMENTS

- The Act defines biobased products as commercial or industrial products that are composed, in whole or in significant part, of biological products or renewable domestic agricultural materials (including plant, animal, and marine materials) or forestry materials

WHY DID CONGRESS CREATE THIS PROGRAM?

- To spur demand growth for new biobased products
- To grow demand for agricultural commodities
- To encourage development of processing and manufacturing in rural communities
- To capture environmental benefits
- To enhance the Nation's energy security

WHAT DOES THE PROGRAM REQUIRE?

- All Federal agencies must purchase biobased products that have been designated by the program, unless:
  - The products are not reasonably available
  - The products fail to meet performance standards for the application intended
  - The products are available only at an unreasonable price

WHAT DOES THE PROGRAM DO FOR FEDERAL AGENCIES?

- Encourages purchase of more environmentally sustainable products
- Helps Agencies identify those products
- Will increase the availability and diversity of biobased products

WHAT DOES THE PROGRAM DO FOR MANUFACTURERS AND VENDORS?

- Creates a preferred market for biobased products
- Provides large scale demonstration of biobased products performance in use
- Spurs development of new biobased products
- Develops alternatives to fossil energy based products

EXCLUSIONS FROM THE PROGRAM

- The following product groups are excluded from the program by statute:
  - Food and feed
  - Motor vehicle fuels
  - Electricity

PROPOSED USE AS FUEL ADDITIVES

- Ethanol as a fuel additive
  - Less than a 10 percent blend
  - Primary market may be to enhance air quality
- Biodiesel as a fuel additive
  - Less than 10 percent blend
  - Primary market may be lubricity for fuel pumps and injectors

FEDERAL AGENCIES MUST ASSURE THEIR SPECIFICATIONS COMPLY

- Within one year after guidelines are issued, assure that agency specifications require use of biobased products
- Agencies must create procurement program
  - A biobased products preference program
  - An agency promotion program
  - An annual review and monitoring of effectiveness of agency's program

REQUIREMENT APPLIES TO:

- Purchase or acquisition of a procurement item where the purchase price exceeds $10,000. Or,
- Where the quantity of such items purchased in the preceding fiscal year was $10,000 or more
- Requirement is applied at agency level

TO USE THE PROGRAM A MANUFACTURER CAN:

- Claim coverage under the program for all products for which generic groupings of products have been designated by rule making
- Certify that a product's biobased content is consistent with statutory definition
- Certify biobased content meets minimum requirement, using ASTM standard test

ADMINISTRATIVE PROCEDURES ACT

- Constrains what OEPNU can say about details of rules in clearance
- Purpose is to provide level playing field for stakeholders in rule making
- Public comment period offers stakeholders an opportunity to make views known
- All public comments considered in drafting final rules

STATUS OF IMPLEMENTING THE PROGRAM

- Final rule to establish program has been published in *Federal Register*, January 11, 2005
- Proposed rule to designate the first six items (groupings of products) for preferred procurement under the program has been published in the *Federal Register*, July 5, 2005
- Final rule to designate first six items is in clearance in USDA
- Plans are for subsequent designation rules to designate balance of items as soon as possible

ITEMS PROPOSED FOR DESIGNATION

- Mobile equipment hydraulic fluid
- Urethane roof coatings
- Water tank coatings
- Diesel fuel additives
- Penetrating lubricants
- Bedding, bed linens, and towels

IMPLEMENTATION STATUS, CONTINUED

- As many as 36 items (groupings of products) expected to be proposed for designated for preferred procurement under the program this calendar year
- OEPNU has currently identified 130 items to be designated
- A proposed rule to establish the voluntary "U.S.D.A. Certified Biobased Product" labeling program is in clearance in USDA

EXAMPLES OF PRODUCT ITEMS

- Two cycle engine oils
- Metal complex grease
- Janitorial cleaners
- Industrial cleaners
- Hand cleaners/Sanitizers
- Composite panels
- Biodegradable films

DESIGNATING PRODUCT ITEMS

- Must be done by rule making process
  - Proposed rule
  - Public comment period
  - Final rule
- USDA must consider information on
  - Product availability
  - Economic and technological feasibility of use, including life cycle costs

DESIGNATING PRODUCT ITEMS

- USDA must also provide information to Federal agencies concerning:
  - Relative price
  - Performance
  - Environmental and public health benefits
  - And, where appropriate, recommend a level of biobased content in the procured product

SHORT LIFE PRODUCTS

- When Designating Such Items, FB4P Will Require Products To Meet ASTM Bio-Degradability Standards
- Compostability Will Not Be Sufficient To Qualify For Preferred Procurement

MANUFACTURERS CAN HELP USDA GET PRODUCTS DESIGNATED

- We need information on a number of individual products within an item (generic grouping) in order to designate that grouping by rule
- Please contact Steve Devlin at Iowa State University with product information. His phone is 515-294-5416
- Our website: www.biobased.oce.usda.gov is a good source of information on this program

USDA IS DEVELOPING A MODEL PROCUREMENT PROGRAM

- Under leadership of Departmental Administration
- In coordination with the Office of Federal Procurement Policy of OMB
- This program will be available to all Federal agencies
- Its purpose is to train agencies, educate, and promote use of biobased products

Conclusion

- A final rule establishing the program has been issued on January 11, 2005
- The proposed rule to designate the first six items (groupings of products) eligible for preferred procurement has been published on July 5, 2005: a final rule is in clearance
- A model procurement program will aid Federal agencies in purchasing biobased products
- A proposed rule for a voluntary labeling program will be ready for public comment this fiscal year

State of US Food Composting – Institutional and Municipal Scales

Nora Goldstein
BioCycle, The JG Press, Inc.

State Of Food Residuals Composting
In The United States

Nora Goldstein
BioCycle, Journal of Composting & Organics Recycling
Emmaus, Pennsylvania
www.biocycle.net

BioCycle

ICI Food Residuals Composting Projects

Year	Farm	Private	Municipal
1995	30	18	6
2005	n/a	<50 (est)	<5

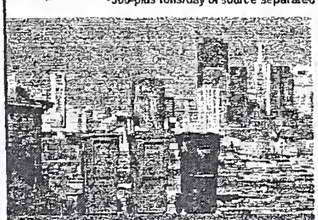
Source: BioCycle National Surveys

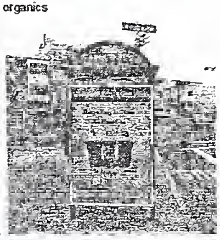
BioCycle

City and County of San Francisco, California

Three-Stream Source Separation

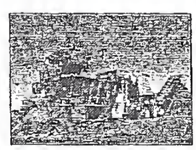
- Residential, commercial and institutional organics diversion
- 150,000 households
- 300-plus tons/day of source separated organics

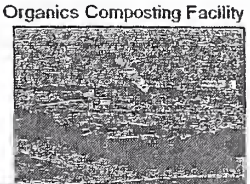




BioCycle

Norcal Waste Systems'
Jepsen Prairie Organics Composting Facility





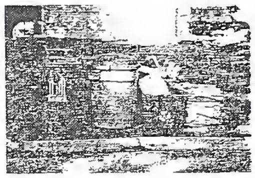
Composting System
- Pre-grinding
- Initial composting in Ag-Bag pods
- Windrows

Photos courtesy of Applied Composting Inc

BioCycle

City of Toronto, Ontario, Canada

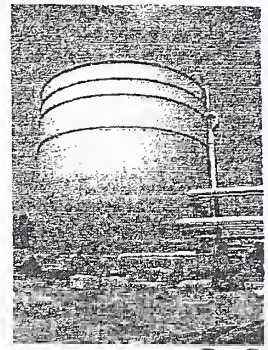
500,000 households
Weekly collection of organics in 13-gallon wheeled cart



Toronto, Ontario

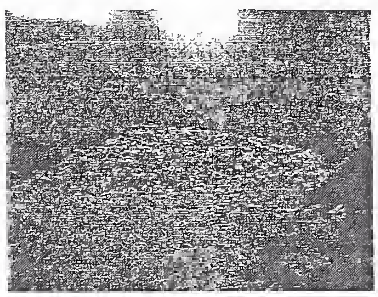
Dufferin Transfer Station

- 25,000 tonnes/year
- Residential biowaste
- BTA anaerobic digestion technology
- Digestate composted off-site in Gore cover system



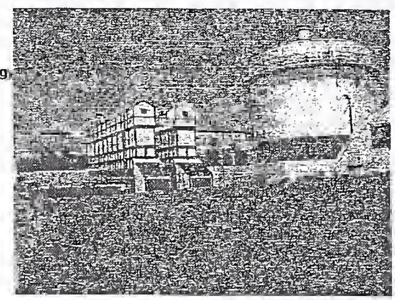
Newmarket, Ontario

- 50,000 tonnes/year
- Residential biowaste



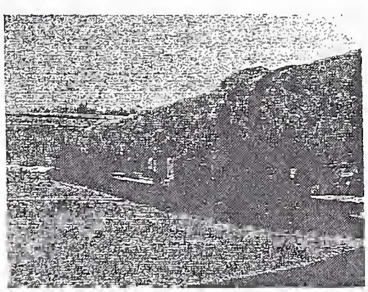
Newmarket Plant

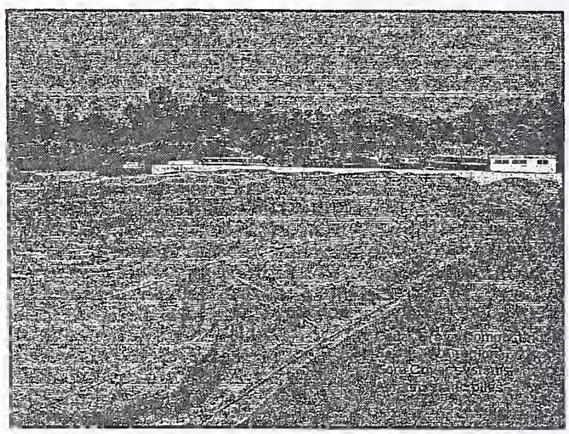
- BTA AD technology
- VCU composting
- Off-site curing at soil blender



WeCare Environmental
Marlborough, MA

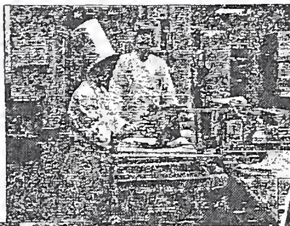
Two Bedminster rotary digesters
Aerated Windrows
100 tpd MSW; 50 tpd biosolids

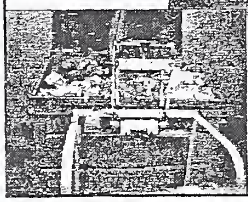




Commercial organics diversion in San Francisco Bay area:

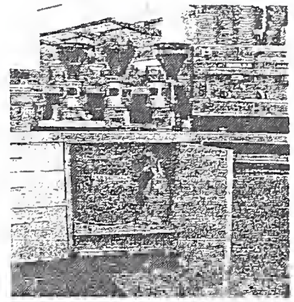
- 2,000 businesses
- 36,000 tons/year diverted





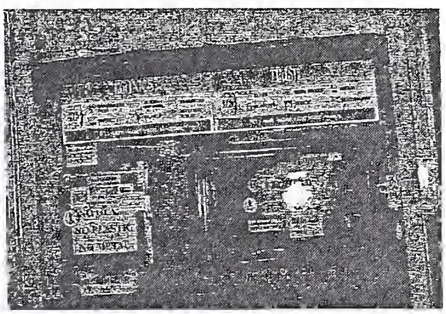
Photos courtesy of Applied Composting, Inc.

BioCycle



Capturing Food Residuals At Portland (OR) Airport Coffee Shop

BioCycle



Grocery Store Installation – Direct To Compactors

BioCycle

Challenge: High contamination rates – especially glass and plastics

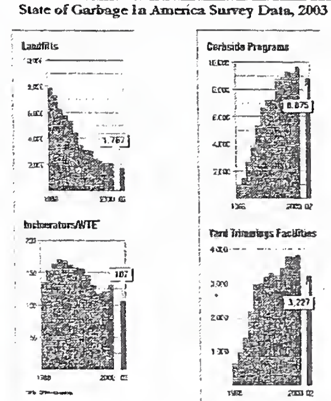
Photos courtesy of Applied Composting, Inc.

Public Policy Predictions

- State landfill bans on green waste disposal create composting infrastructure
- Landfill diversion, recycling goals and mandate (California) – create policy incentives
- Permitting for clean SSO streams less onerous than mixed waste

BioCycle

State of Garbage In America Survey Data, 2003



BioCycle

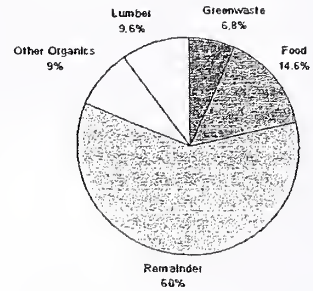
Public Policy Realities

- No capacity shortage in U.S. because of willingness to long-haul to "mega-landfills"
- California only state with teeth in its diversion goal
- City and county visions of sustainability drive some programs
- Higher disposal costs in some regions make increased organics diversion economically feasible
- Permitting an obstacle
- Tools have been developed by state agencies, e.g., density mapping, training manuals

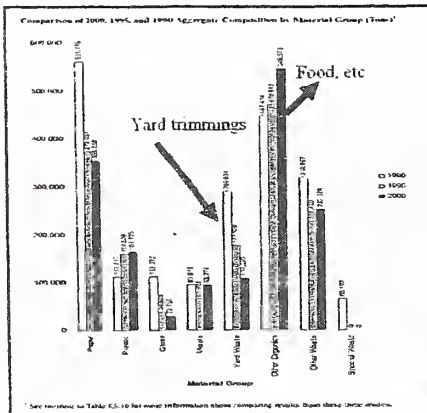
BIOCYCLE

ORGANICS ARE THERE TO TAP

California Integrated Waste Management Board Waste Characterization Study (2003)



BIOCYCLE



BIOCYCLE

Project Development Predictions

- ICI organics clean stream, "ripe for the taking"
- Winning combination of organics and materials recycling can yield 90%-plus diversion in some cases – and positive economics
- Ideal C:N marriage of adding food residuals to existing yard trimmings composting infrastructure
- Tiered regulations encourage facility development

BIOCYCLE

Project Development Realities

- ICI organics clean stream is "ripe for the taking" and huge diversion plus for some generators
- Hauler resistance, route density
- Facility siting and management issues
  - Farm-based challenges, e.g., year-round access
  - Management requirements, capital investments, regulatory requirements when scale up yard trimming site
- Bit of myth with tiered regs: Pre versus Postconsumer
- Contamination
  - Organics-rich loads in San Jose area
  - Big positive on training generators re: source separation
- Quick comment on residential organics diversion

BIOCYCLE

Biobased Products in Evolution of Food Residuals Diversion, Composting

- Generator resistance to giving up plastic on the one hand ....
- .... Plastic huge headache for composters on the other hand
- Chicken and egg evolution of the compostable plastics industry
  - Credibility of research, claims, etc.
  - Availability, reliability
- Generator sectors where biobased products open up opportunities
  - Stadiums, entertainment complexes
  - Festivals
  - Food service/cafeterias

BIOCYCLE

21st Century Waste Management Realities

- Kick start with public policy-based incentives (disposal still cheap and abundant)
- High up on the learning curve in terms program initiation and management
  - Source separation training
  - Collection schemes – containers, route density
  - Processing requirements (don't degrade gracefully)
- Facility economics continue to be challenge
  - Need to manage environmental impacts
  - Have to compete on cost ..... But value attached to service, problem solving (e.g., leaking compactors)
  - Less frequent trash collection
  - "Great to be Green" factor

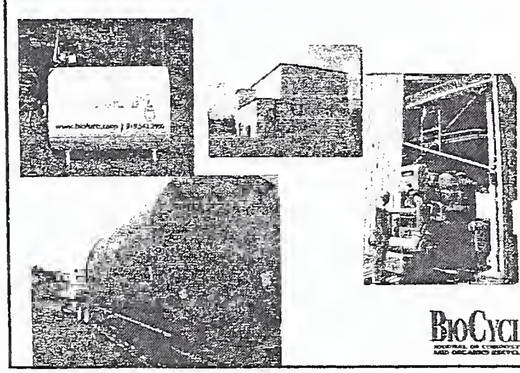
BioCycle

Related Trends and Opportunities

- Market, end-use driven solutions, e.g., disease suppressive composts, effective erosion & sediment control that create need for organics diversion infrastructure
- Energy, Healthy Soil and Clean Water: Growth potential as natural resource "creators" and environmental problem solvers

BioCycle

Piedmont Biofuels: Commercial Facility



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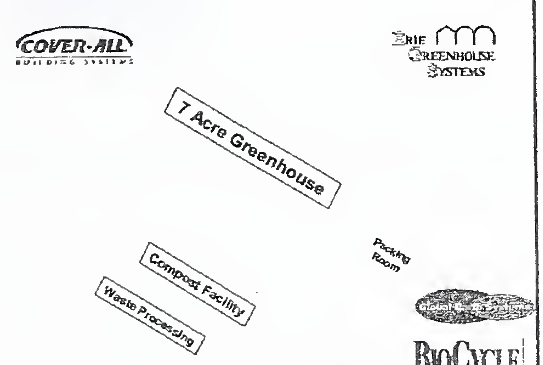
Biothermal Energy Recovery

- Mass temperatures exceed 170°F
- Channel floors reach 140 – 150°F
- Heat exchanger fluid reaches 125-140°F

Global Earth Products, Utopia, Ontario, Canada

BioCycle



Biomass Energy System

BioCycle

Biobased Product Policy Needs

- Put teeth into federal public policies
  - EPA Resource Conservation Challenge
  - Farm and Energy Bills – make the energy connections
  - These will help create and sustain markets for biobased products and production of high quality composts
- Consider state disposal bans on clean ICI organics
- Push hard on true costs of disposal, value of natural resources

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Biobased Product Research Needs

- Economic Analyses
  - Cost/price point
  - Supply/demand issues
- Credibility of products. claims
- Fund objective, quality controlled studies to independently verify claims, soil impacts, etc.
- Take advantage of current focus on seeking petroleum-based product replacements

BioCycle

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BioCycle

USDA Whitten Cafeteria Pilot Program with Biobased Products Materials Procurement

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USDA/DA/OPPM

Rosalie E. Green, Senior Recycling Specialist
SEE Associate with USEPA, Office of Solid Waste

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USDA, Agricultural Research Service
Beltsville Agricultural Research Center

Randy Townsend
USDA, Agricultural Research Service
Beltsville Agricultural Research Center

USDA United States Department of Agriculture

Jamie L. Whitten Federal Building Cafeteria Biobased Pilot Program

MIKE GREEN
PROGRAM MANAGER
BIOBASED CONTRACTING PROGRAM
DEPARTMENTAL ADMINISTRATION
OFFICE OF PROCUREMENT AND PROPERTY MANAGEMENT

Food and Biobased Cafeteria-Ware Composting Roundtable

December 08, 2005

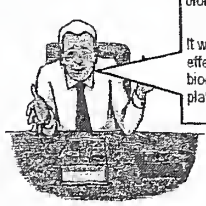
Background

USDA is charged by the 2002 Farm Bill to develop an affirmative biobased procurement model. The model includes:

1. **A biobased product procurement preference program;**
2. **A biobased product promotion program; and**
3. **An annual review to determine program effectiveness**

USDA AGRICULTURE 2

Why Did We Conduct This Pilot?



The Pilot served as Departmental Administration's (DA) first step to promote the use and procurement of biobased products.

It was a live demonstration that allowed DA to test the effectiveness and patron acceptability of biobased, biodegradable food service products such as cups, plates, and cutlery in the Whitten Building cafeteria.

USDA AGRICULTURE 3

What Was Our Objective?

To promote the use of biobased food service products in USDA cafeterias and to promote awareness of biobased products to USDA staff.

USDA AGRICULTURE 4

Program Strategy, What Was It?

1. 1.Put Team Together.

   2.Develop implementation plan to make customers aware of the pilot and the impact that biobased products have on the environment;

   3.Locate biobased products to replace 100% of current Styrofoam and plastic food service items;

   4.Partner with ARS to compost biobased product waste;

   5.Develop plan to collect biobased waste;

   6.Collect cafeteria patrons' comments on a daily bases;

   7.Gather compost and use on USDA Property and determine life cycle cost of project, and

   8.Expand use of biobased cafeteria-ware to all of USDA's cafeterias.

USDA AGRICULTURE 5

What Were The Results?

1 The Pilot was considered a huge success;

2 In a period of three months, the cafeteria serve 33426 patrons;

3 By in large, patrons accepted the use of biobased cafeteria-ware as a suitable change from the typical Styrofoam and plastic ware;

4. Fewer than 150 negative comments were received. Comments can be characterized as follows:

- A dislike for the products overall,
- cups used for hot liquids became to hot to hold,
- Bottom of plates and bowls became too soft,
- Straws broke; and
- Left a bad taste in the food.

USDA AGRICULTURE 6

What Were The Results?

5. Only a small amount of contaminant was found in the materials that were to be composted;
6. Biobased products for the pilot cost ***$14,367.42*** with total freight charges of ***$952.83***. USDA's part of the overall cost was ***66%*** or ***$9482.50*** and the cafeteria contractor's portion was ***33%*** of or ***$4884.92***
7. The pilot tested a wide variety of biobased products that included;

12 oz Bagasse Bowl
32 oz Clear Cylinder Food Container - Made from Corn - No Hot Foods 7" Sturdy Bagasse Plates
9" Sturdy Bagasse Plates
12 oz Cold Cup - Made from Corn
20 oz Cold Cup - Made from Corn
24 oz Cold Cup - Made from Corn
Flat Lid with Straw Slot for 12/20 oz - Made from Corn
Flat Lid with Straw Slot for 24 oz - Made from Corn
9" x 12" Tray - 99.9% Recycled Content - Biodegradable
2-Cup Carrier - Recycled - Biodegradable

USDA AGRICULTURE 7

What Were The Results?

7. The pilot tested a wide variety of biobased products that included;

8 oz Hot Food Container - 99.9% Recycled Content
16 oz Clear Cylinder Food Container - Made from Corn - No Hot Foods
8 oz Clear Cylinder Food Container - Made from Corn - No Hot Foods
Lid for Clear Cylinder Food Container - Made from Corn
12 oz Bio-Coated Hot Cup - Biodegradable
16 oz Bio-Coated Hot Cup - Biodegradable
Hot Cup Jacket - Recycled - Biodegradable
12 oz Recyclable Plastic Water Cup
8" Thin Straw - Made from Corn
Fork - Heat-stable
Spoon - Heat-stable
Corn Fork - Not for Hot Food
Corn Spoon - Not for Hot Food
Corn Knife - Not for Hot Food
Knife - Heat-Stable
Plastic Lid for 16 oz Hot Food Container **Not Biodegradable**
Plastic Lid for 8/12 oz Hot Food Container **Not Biodegradable**
Black Plastic Lid for 16 oz Bio-Coated Hot Cup **Not Biodegradable**

USDA AGRICULTURE 8

Cost Comparison for First Month

	Biodegradable			Conventional		
	# of cases	Case price	TTL Cost	# of cases	Case price	TTL Cost
6" / 7" plate	8	$ 71.00	$ 568.00	8	$ 15.70	$ 125.60
9" plate	15	$ 55.00	$ 825.00	15	$ 18.19	$ 272.85
lid 12/20 oz	4	$ 39.90	$ 159.60	8	$ 13.49	$ 107.92
Tray	18	$ 35.00	$ 630.00	18	$ 18.17	$ 327.06
2 cup carrier	8	$ 36.50	$ 292.00	8	$ 40.72	$ 325.76
12 oz bowl	2	$ 65.00	$ 130.00	4	$ 19.26	$ 77.04
30 oz bowl	4	$ 75.15	$ 300.60	4	$ 33.31	$ 133.24
16 oz food cup	4	$ 52.60	$ 210.40	4	$ 15.00	$ 60.00
12 oz food cup	2	$ 71.95	$ 143.90	4	$ 13.35	$ 53.40
8 oz food cup	2	$ 66.30	$ 132.60	4	$ 26.33	$ 105.32
lid for 16 oz fo	2	$ 47.45	$ 94.90	4	$ 15.64	$ 62.56
12 oz hot cup	5	$ 67.50	$ 337.50	5	$ 17.40	$ 87.00
16 oz hot cup	4	$ 75.00	$ 300.00	7	$ 15.28	$ 106.96
Hot cup jacket	1	$ 49.80	$ 49.80	1	$ 50.29	$ 50.29
Hot cup lid	2	$ 36.50	$ 73.00	4	$ 13.65	$ 54.60
12 oz water cu	3	$ 43.65	$ 130.95	3	$ 61.00	$ 183.00
Straws	10	$ 3.95	$ 39.50	8	$ 1.42	$ 11.33
Fork	5	$ 149.80	$ 749.00	10	$ 21.29	$ 212.90
Knive	5	$ 149.80	$ 749.00	10	$ 21.59	$ 215.90
Soupspoon	3	$ 149.80	$ 449.40	5	$ 7.70	$ 38.50
Teaspoon	2	$ 149.80	$ 299.60	5	$ 7.46	$ 37.30
60 gal trash lin	9	$ 56.90	$ 512.10	6	$ 20.10	$ 130.50
		Total	$ 7,176.85			$ 2,779.03

USDA AGRICULTURE 9

Lessons Learned

1. Difficult to find product;
2. Cost is almost 300% more than conventional cafeteria-ware;
   - More producers/dealers must be found. This will increase competition and reduce overall costs. (USDA is posting a "Sources Sought Notification" in FedBizOps this week.
3. Everyone cannot be pleased, but that's OK
4. Good planning, quality awareness training, constant communications, superior team work and MANAGEMENT BACKING are essential to a successful program; and
5. The use of Biobased Products are the future.

USDA AGRICULTURE 10

For additional information I can be contacted at:

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U.S. Department of Agriculture
Departmental Administration
Office of Procurement and Property Management

11

Keys to Success of San Francisco Food Composting & Compostable Product Ware Use

Jack Macy
Commercial Recycling Coordinator,
City and County of San Francisco

Keys to Success of San Francisco's Food Composting & Compostable Product Ware Use

USDA Roundtable on Cafeteria Food & BioBased Ware Composting
December 8, 2005

Jack Macy
SF Environment
City and County of San Francisco
jack.macy@sfgov.org
415-355-3751

San Francisco Program Background

- Population: 760K res. & 1.3 million daytime in 47 sq. miles
- Multilingual: 40% don't speak English at home
- 2 permitted haulers, Norcal Waste Systems Co's, collect all trash & compostables, and much recyclables
- Variable garbage rates via City rate approval process for Norcal
- Composting collection pilots started 1996 for commercial and 1997 for residential, citywide residential rollout started in 2000
- Composting program now serves 2000 businesses & institutions, and 150,000 households
- Composting program currently diverts over 300 tons per day of source-separated food and other compostables
- 1.8 million tons per year total SF waste generation in CY 2003
- Total SF waste diversion was 67% in CY 2003

Strategies For Food Diversion

- Edible Food Donation
  - Pre-Consumer to Food Bank, Food Runners or Direct to user
- Animal Feed
  - Brewery, Tofu and Bakery Residuals to Farmers or Processors
- Rendering
  - Grease (FOG) Rendered into tallow and animal feed
- On-site Composting
  - Residents, Schools and Colleges
- Centralized Composting
  - Wide range of source-separated compostables to regional composting facilities

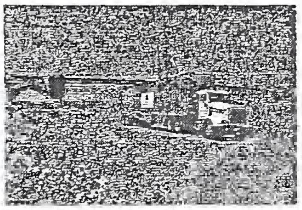
Keys to SF Food Composting Success

1. Create policies and goals to drive programs, higher diversion and greater sustainability.
   - California Mandated 50% by 2000
   - SF Goals Adopted by Board of Supervisors
     - 75% Landfill Diversion by 2010
     - Zero Waste by 2020
     - Achieve through Highest and Best Use

Keys to SF Food Composting Success

2. 22. Create a beneficial public/private partnership with mutual goals.

Building a Bridge Together to a Sustainable Future



3. Provide financial incentives to both service providers and generators to achieve goals.

SF Service Provider Financial Incentive

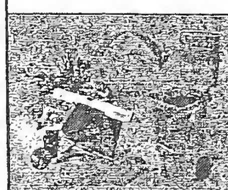
- San Francisco garbage rate setting process allows City to approve program costs and incentives to achieve City goals.
- San Francisco created a Diversion Incentive Account (DIA) with up to two tiers of disposal tonnage goals per year for 5 year rate plan:
  - Meet Tier I goal and increase profit by 1%
  - Meet Tier II goal and increase profit by 1.55%
- Norcal increased pace of program rollout to meet DIA goals which they have achieved since DIA started on July 1, 2001.

SF Generator Financial Incentive

- Residents pay only for volume of trash container and not for recycling or composting
- For Businesses recycling is typically at no extra charge and composting at a 25% discount off the standard garbage rate. Saving money is a big incentive, especially with high diversion.
- New proposed rates will be discounted based on generator service volume diversion, e.g., if 50% of volume is recycling or composting, then 50% discount applied to all containers.

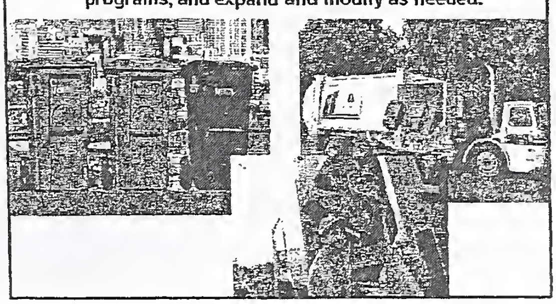
Keys to SF Food Composting Success

4. Target all food – pre and post consumer, food service ware, plant trimmings and other compostables. Start with easiest to recover.



Keys to SF Food Composting Success

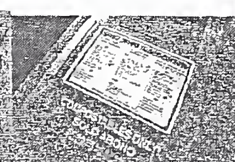
5. Avoid start and stop pilots, test & demonstrate programs, and expand and modify as needed.



Keys to SF Food Composting Success

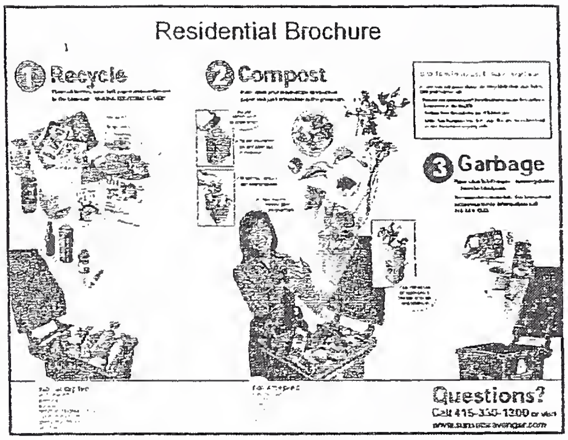
6. Design an easy to understand and use color-coded sorting & collection container and photo image graphic education system.

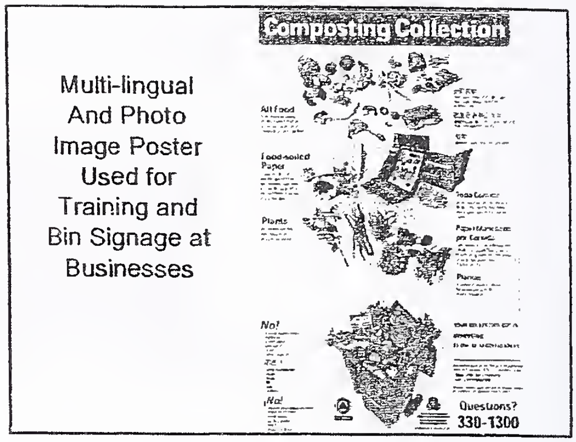
Color Coded Kitchen Pail

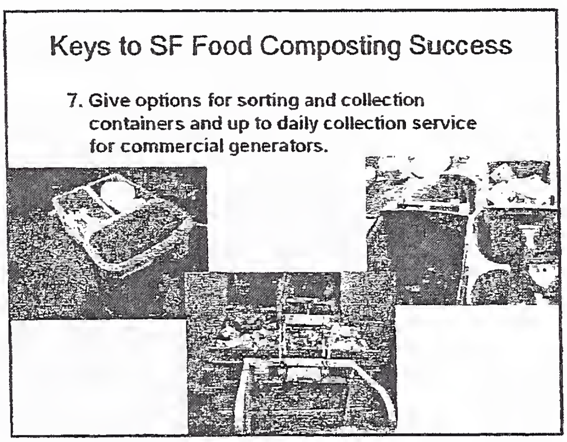


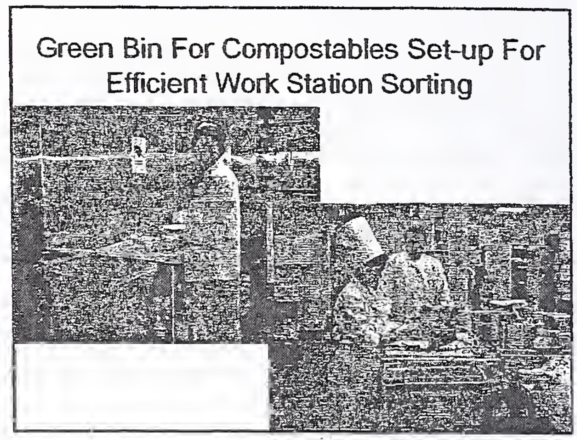
Labeled Lids – Now use more picture graphics

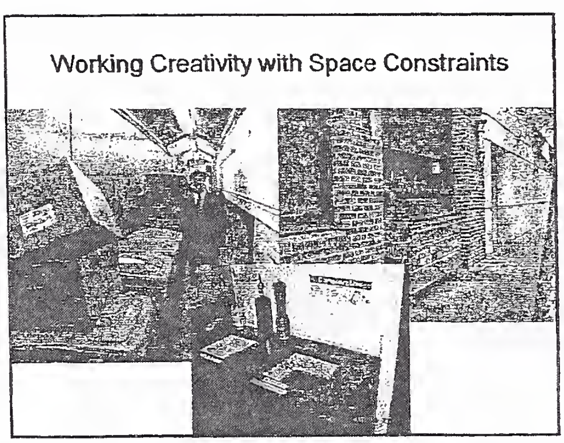
Wheeled Cart for Safety and Convenience

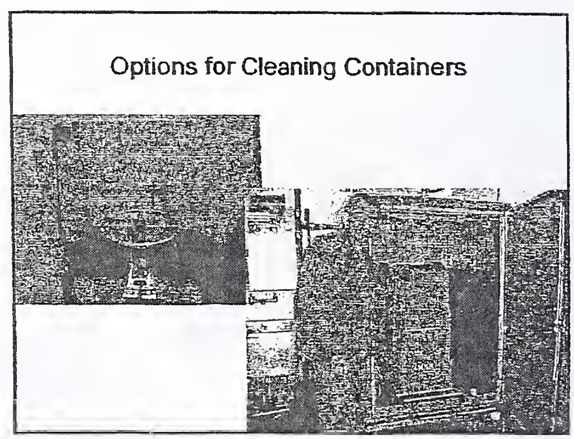

Residential Brochure
1 Recycle
2 Compost
3 Garbage
Questions?


Multi-lingual
And Photo
Image Poster
Used for
Training and
Bin Signage at
Businesses
Composting Collection
Questions?
330-1300

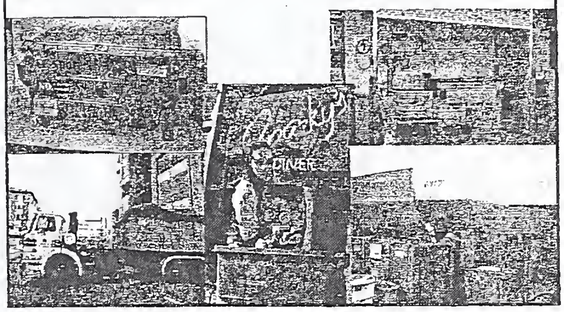

Keys to SF Food Composting Success
7. Give options for sorting and collection containers and up to daily collection service for commercial generators.


Green Bin For Compostables Set-up For Efficient Work Station Sorting


Working Creativity with Space Constraints


Options for Cleaning Containers

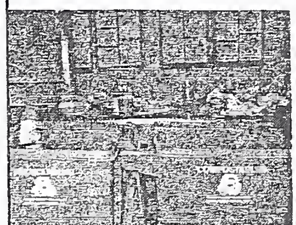
Variety of Container Types and Sizes From Toters to Compactors

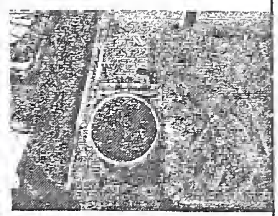


Keys to SF Food Composting Success

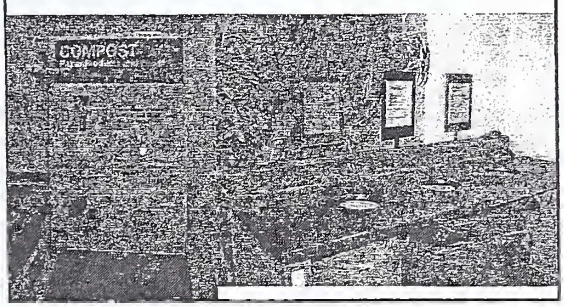
8. Develop composting and recycling programs to minimize contamination and maximize recovery.

Glass can be the most problematic contaminant in compost.



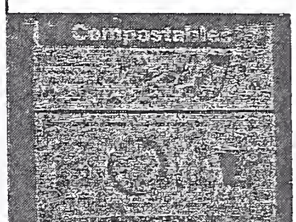


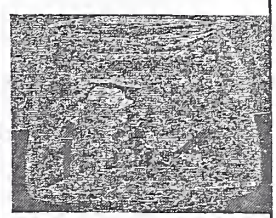
Good Labeling is Key to Keeping Materials Clean – Use Pictures



Keys to SF Food Composting Success

9. Eliminate disposable food service ware and plastic contamination through using reusable, compostable or recyclable products.

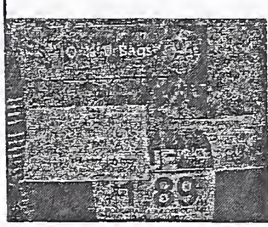




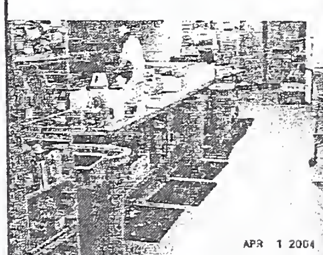
Keys to SF Food Composting Success

10. Only accept food service ware and bags that are certified compostable (e.g., by BPI) or made of only plant fiber and are clearly labeled.

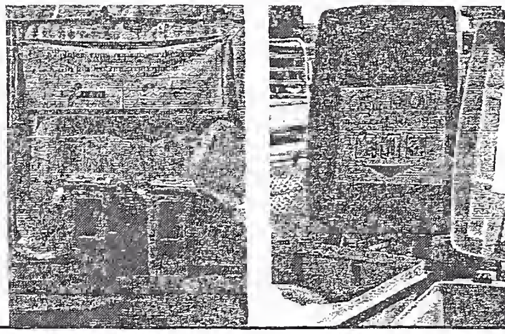
Over 100 stores offer certified compostable bags in SF



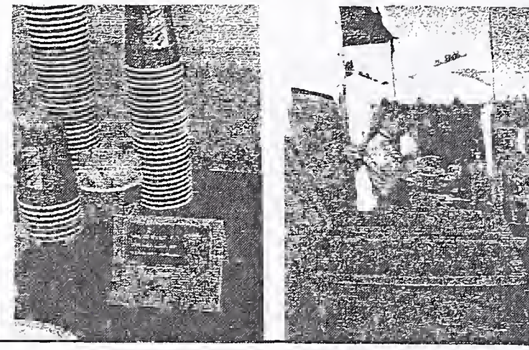
Using Liners Can Help Participation – Transparent and Compostable – Maybe Cost & Performance Issues



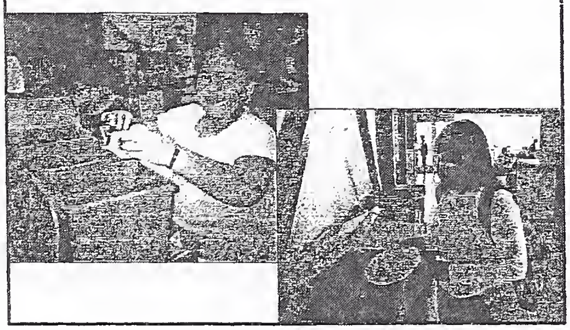
Special Events Using Compostable Food Service Ware



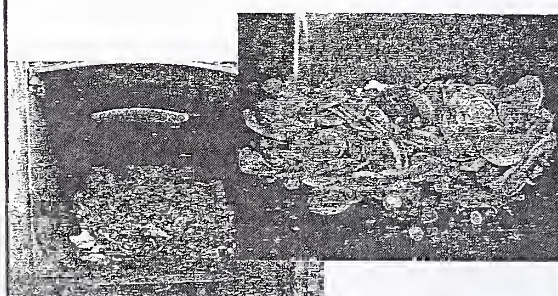
"all of your forks, cups, plates, and napkins are compostable"



50 Schools Have Food Composting – Some Using Compostable Ware



Compostable Service Ware & Food Scraps

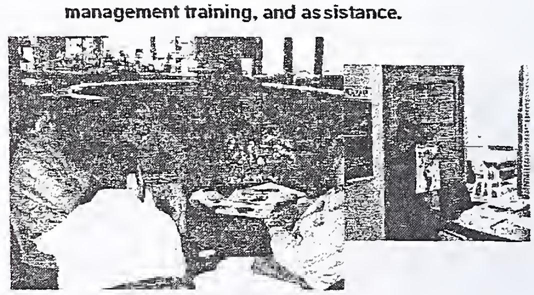


Keys to SF Food Composting Success

11. **Get Management Buy-In at All Levels to Make Program Part of Job Routine and Responsibilities**

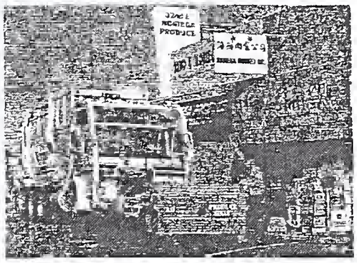
Keys to SF Food Composting Success

12. **Provide on-site set-up, multi-lingual staff and management training, and assistance.**



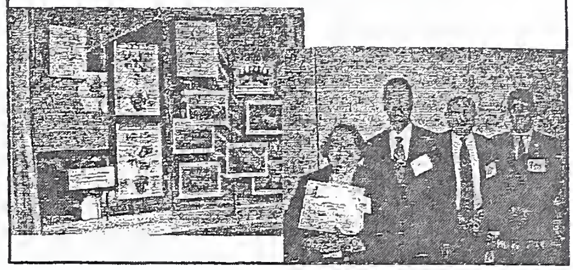
Keys to SF Food Composting Success

13. Monitor contamination and give feedback and assistance to ensure quality control.



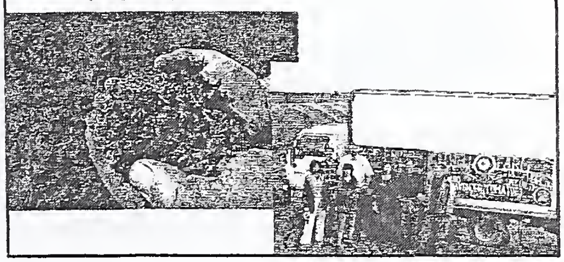
Keys to SF Food Composting Success

14. Provide recognition for excellent participation and results. Scoma's Restaurant wins award with 92% diversion and Hilton Hotel with 50%.



Keys to SF Food Composting Success

15. Create high quality compost, certified for use by organic growers, to close the loop with produce or other products being used by program generators.



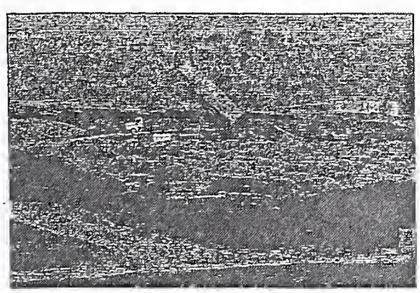
Keys to SF Food Composting Success

16. Improve collection, processing, and product quality and diversity for sustainable benefits.

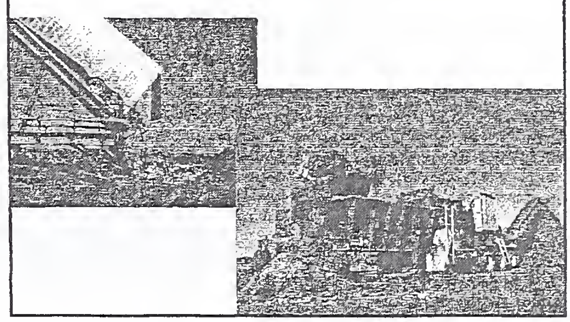
For Example: Reducing Carbon Emissions and Energy Use

Norcal's LNG Fueling Station and Long Haul

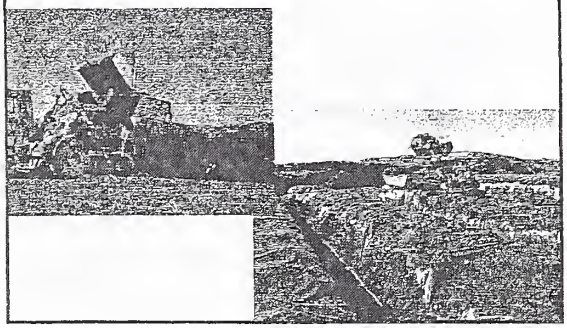
Norcal's Jepsen Prairie Organics Regional Composting Facility



Processing of SF Compostables - High In Nitrogen, Moisture, Fiber And Low In Contamination

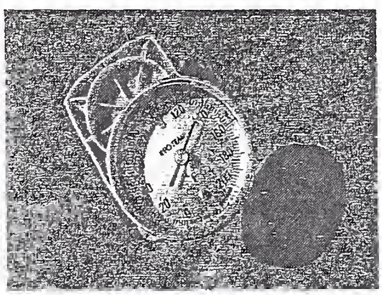


Feedstock Ram-fed Into 200 Foot Long HDPE Ag-Bags

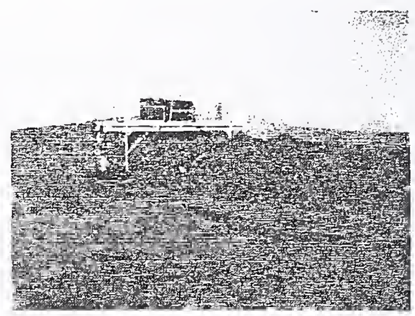


Bags Aerated For 30 Days With Timed Blowers And Perforated Pipes

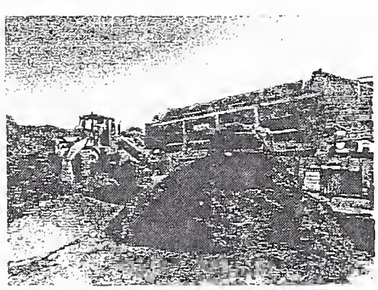
High Temperatures Meet Pathogen Kill (PFRP) Requirements



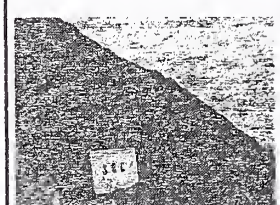
Turned In Windrows For 30 Days

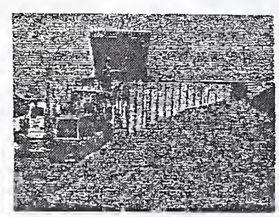


Compost Screened To 3/8 Or ¼ Inch



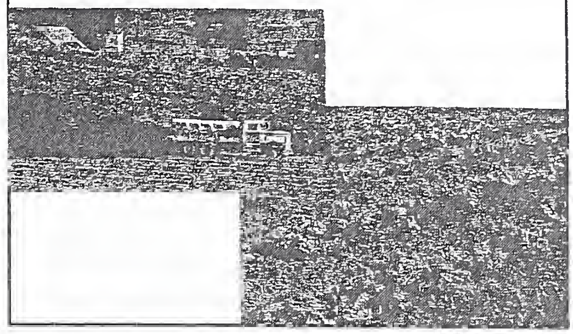
Custom Blending For Markets



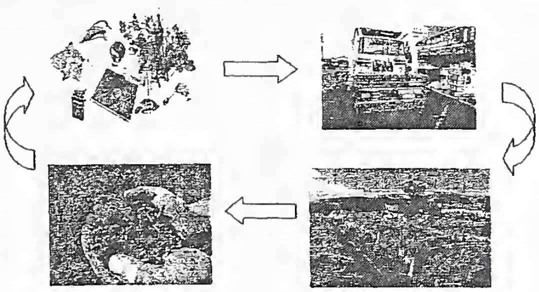


Compost Used For Landscaping & Golf Courses

Compost Used On Organic Farms And Vineyards To Rebuild Healthy Soils



Waste Diversion & Closing the Loop - Food Composting Sustains Soils and Healthy Food that Return to Feed the City



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SF Environment
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www.sfenvironment.org

In-Vessel Containerized Composting

Jim McNelly
Renewable Carbon Management

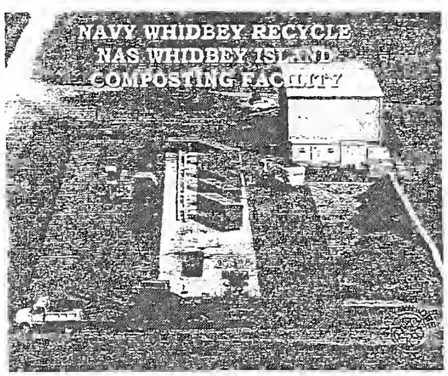
USDA Federal Facilities
Composting Workshop

In-vessel Containerized
Composting

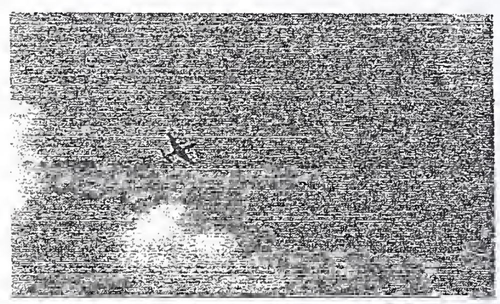
City of Hutchinson, Minnesota

Whidbey Island Naval Air Station
Oak Harbor, WA

City of Hutchinson
Minnesota

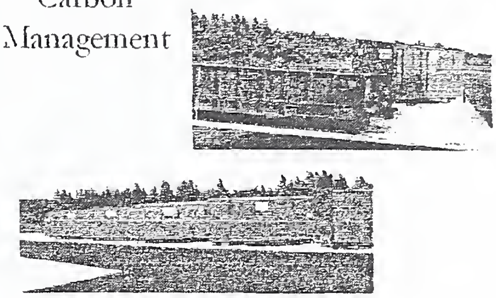


BASH: Bird Aerial Strike Hazard

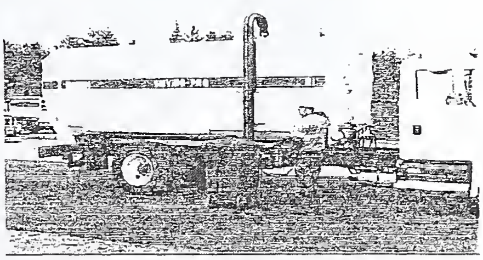


In-Vessel Containerized Composting

Renewable Carbon Management

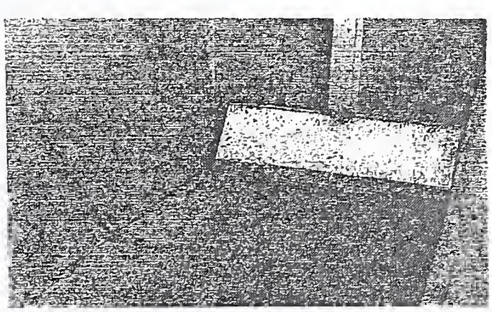


Harsh EnviroPro Mixer



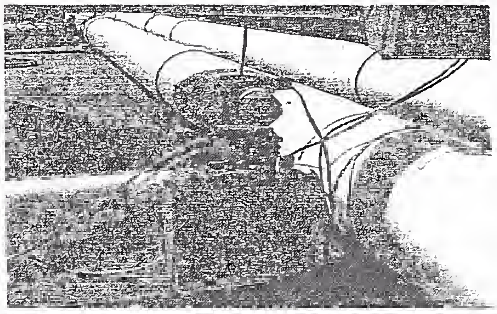
Food Discards and Wood Chips

NaturTech Composting System



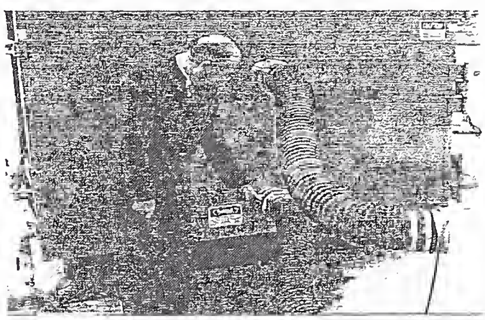
Variable Frequency Drive

Air Velocity Feedback

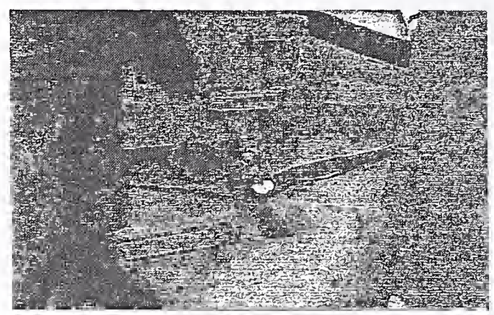


Temperature Feedback

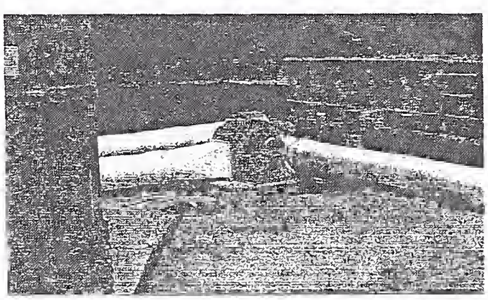
Positive and Negative Air



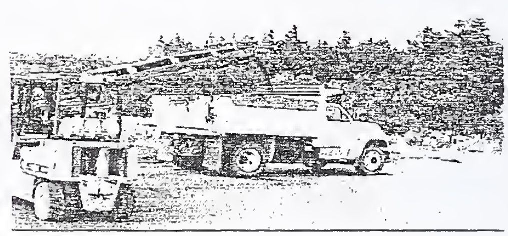
Leachate Capture

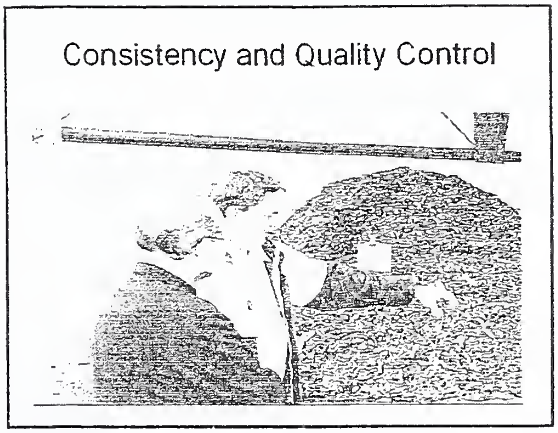


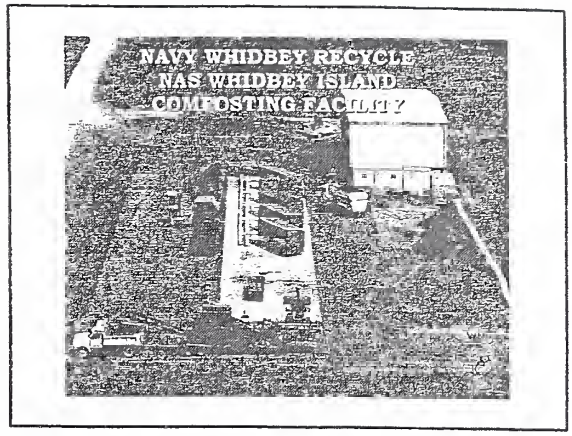
Biofiltration



Screened Compost Used on Base




Consistency and Quality Control


NAVY WHIDBEY RECYCLE
NAS WHIDBEY ISLAND
COMPOSTING FACILITY

An Economic Analysis of Composting

Nadine H. Davitt
The Pennsylvania State University

Economic Analysis of Composting

Nadine Davitt

Penn State University
Organic Materials Processing and Education Center

Food and BioBased Cafeteria-Ware Composting for Federal Facilities in Washington DC

December 8, 2005

PENNSTATE

How much does it cost to compost?

It depends on the situation

Can you make money composting?

Maybe

PENNSTATE

Types of Costs

- Administrative Costs:
  - Record Keeping
  - Public Relations
  - Securing Feedstocks
  - Marketing Product
- Operating Costs:
  - Moving Materials
  - Monitoring Windrows/Piles
  - Site Maintenance
  - Equipment
  - Equipment Maintenance
  - Pad Cost

Account for everything

PENNSTATE

How to Determine Costs

- Need to know:
  - **Hours of productivity in a work day**
  - **Labor rate**
  - **Type of equipment required to meet needs of operation**
  - **Equipment rate**
  - **Pad rate**
- Maintain a Log for Every Task:
  - **Include labor, equipment and supplies**
- Enterprise Accounting:
  - **npost production, mulch manufacturing, soil nding**

PENNSTATE

Labor Productivity

- Scenario:

  8 Hour work day:
  - Travel to site – 15 minutes
  - Morning break – 15 minutes
  - Lunch – 30 minutes – (unpaid)
  - Afternoon break – 15 minutes
  - Return travel – 15 minutes
  - Start up and end day – 30 minutes

- Available Hours for Productive Work – 6.5 hours

PENNSTATE

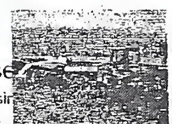
Establish Labor Cost

• Labor Rate	$15.00/ hour
• Fringe Benefit (28.2%)	4.23/ hour
–health insurance, retirement...	
• Breaks	.94/ hour
• Vacation/Sick Leave	1.15/ hour
–4 weeks/year	
• Travel Time	.94/ hour
• Labor Cost/ Hour	$22.26

PENNSTATE

Equipment Needs

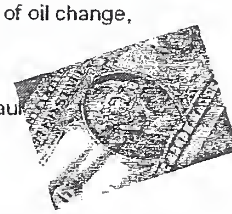
- Consider:
  - Feedstocks Processe
    - stability, required preprocessir
  - Method of Composting
    - static pile, windrow, in-vessel
  - Method of Turning
    - loader, turner
  - Available Space
    - pad and stockpile are



PENNSTATE

Determine Equipment Rate

- Cost
- Financing
- Routine Maintenance
  - frequency and cost of oil change, greasing...
- Repairs
  - tires, engine overhaul
- Hours of Operation
- Fuel



PENNSTATE

Loader

- Cost: $100,000.00
- Interest: $27,278.00
  - finance 10 years @ 5%
- Oil Change: (per service) $150.00
- Grease: $12.50
  - .5 hour/ every 10 hours of operation
- Repairs and Maintenance: ?$?
- Hours of Operation/ year: 500

PENNSTATE

Loader Cost/ Hour

- Scenario: **Life of loader 10,000 hours**
  - Principal and Interest $127,278
  - Routine Maintenance $20,500
    - oil change 40 @ $150/, greasing 1,000 @ $12.50/, cutting edge 10 @ $200/
  - Tires $3,200
    - 2 sets @ $1800/
  - Fuel $41,250
    - 15,000 gallons @ $2.75/

PENNSTATE

Potential Costs

- **Engine Overhaul $5000.00**
- **Tire Puncture** (/tire) **$450.00**
- **Transmission $10,000.00**
- **Hydraulic System $1,700.00**
- **Key** (overnight shipping $45)

PENNSTATE

Determine Cost/ Windrow

- Need to know:
  - Labor and equipment required for each step
    - Construction
    - Monitoring and site maintenance
    - Turning
    - Screening
    - Pa[illegible] area

PENNSTATE

Account for Labor and Equipment

Name/Operator: ________ Project: ________ Date: ________

Total Time: HOURS____ Overtime HOURS____	Labor	JD Loader	Mixer	Tractor	Mower	Truck	Passenger Vehicle	Turner	[illegible]	Screen	[illegible] Dump Truck	Others	Others
Travel													
Set-up/Attach Equipment													
[illegible]													
[illegible]													
Turning													
Screening													
Loading Finished Product													
[illegible]													
Temperature Recording													
Site Maintenance													
Equipment Maintenance													
Data Entry													
Other													
Other													

Description of work performed: ________

Windrow Cost Analysis

- Scenario:
  - Process ~ 12 tons feedstocks/day
  - Windrow size: 5' H x 10' W x 150'L
  - Pad size: ~ 1 acre concrete surface
- Need to Know:
  - Tons/ windrow and length of time to construct
  - Number of times turned
  - Hours labor and equipment
    - mixing, monitoring, trash pick-up, turning, screening

PENNSTATE

Windrow Cost Analysis

- Tons/ windrow = ~100
- Length of time to construct = 6 days
- Number of times turned = 5
- Hours labor and equipment:
  - mixing = 2 hours labor, tractor and mixer/ day.

    1.5 hours loader/day.
  - monitoring and trash pick up = 0.25 hours 3x/week
  - turning = .5 hours labor, tractor and turner/ turn

    .25 hours loader

PENNSTATE

Windrow Cost Analysis

- Mixing ($160/day) $960.00
- Monitoring/Maintenance ($17/week) $250.00
- Turning ($40/turn) $200.00
- Screening ($100/hour) $350.00
- Pad Use Cost (concrete surface) $325.00
- Misc. - (lab fees, administrative) $350.00

Cost/ windrow

PENNSTATE

Net Income/ Windrow

- Tipping Income: (ave. tipping fee/ ton \$36) \$3,600.00
- Finished Compost: (yield 90 yd^3 @ 15/yd^3) \$1,350.00
- Cost of Production: <\$2,435.00>
- Net Income/ Windrow: \$2,515.00

Account for Inflation

- Calculate production costs and compound forward by selecting an inflation rate and period of time
  - Future Cost = FC
  - Present Cost = PC
  - Inflation (%) = i
  - Number of Years = n
  - $FC = PC(1 + i)^n$

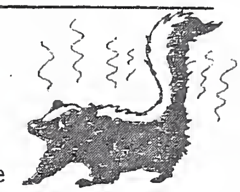
Cost in 10 years

Present Cost/ windrow = \$2,435.00

Inflation = 2.75%

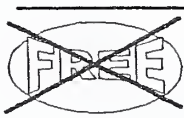
- $FC = PC(1 + i)^n$
- $FC = \$2,345(1+.0275)^{10}$
- $FC = \$2,345(1.3117)$
- Cost/ Windrow in 10 years = \$3,075.94

Additional Factors

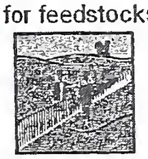


- Weather
- Odor
- Quality
- Down time
- Skill of operator
- Opportunity Cost

Remember



- Account for everything
- Product has value
- Receive a tipping fee for feedstocks
- Be a good neighbor



Costs are specific to operation

apply cost analysis methods to each situation

Cost information is essential to determining profitable endeavors

Nadine Davitt
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814-865-6606

Panel: Industry Perspectives: Ways to Move Forward

Biobased Products: Opportunities and Issues for Growth

Steve Mojo
Biodegradable Products Institute

Biobased Compostable Foodservice Products

Opportunities and Issues for Growth

Steven Mojo
BPI Executive Director

BPI Biodegradable Products Institute

Overview

- BPI Membership & Mission
- Status of compostable products
  - Standards
  - Food Scrap Diversion Efforts
  - Labeling Confusion
- Issues to Growth
  - Composting growth
  - Lifecycle & Economic Benefits?
  - Biobased Resins & Traditional Recycling
  - Labeling: Key to success

BPI Mission

- Not for profit trade assoc: established 1998
- Promote production, use and recovery biodegradable materials & organics recovery via composting
- Utilize scientifically based specifications
- Global harmonization of standards & specifications
- Certification of products based on specifications
- Education

COMPOSTABLE

BPI Members & Assoc.

BASF	G. Pacific	USCC
Biobag	Heritage Bag	CPIA EPIC
Biota Water	Huhtamaki	CFECA
Cereplast	Innovia Films	CA. Film & Bag
Cortec	Metabolix	Mass DEP
Danimer Sc.	NatureWorks	
DuPont	Novamont	DIN Certco IBAW
Fabri-Kal	Poly-America	BPS (Japan)
Farnell	W. Ralston	EBPA (Taiwan
Fortune Plastics	Zerust Cons. Prod.	

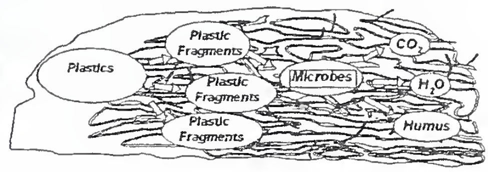
Current Status Compostable Products

BPI Biodegradable Products Institute

Degradable vs. Biodegradable Plastics?

- Typically 2 step process
  - Degradation Fragmentation Heat, moisture oxygen, sunlight and or enzymes shorten & weaken polymer chains, resulting in fragmentation
  - Biodegradation Fragments consumed by microorganisms as a food & energy source and converted to carbon dioxide at an acceptable RATE

Degradation/Fragmentation → **Biodegradation**



Key Properties for Compostable Plastics

- ASTM & ISR identified 4 criteria
  1. **Mineralization/Biodegradation**
     Conversion to carbon dioxide, water & biomass via microbial assimilation
  2. **Disintegration**
  3. **Same rate as natural materials**
  4. **Safety**
     - **No impact on plant growth**
     - **Regulated Metals Limits**

Basis for specifications in Europe, Japan & NA

ASTM Specifications: Compostability

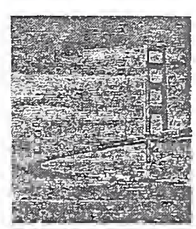
- ASTM D6400
  - *"Specification for Compostable Plastics"*
  - For films and solid plastic products
  - Demonstrates "inherent biodegradability" under optimal aerobic conditions
  - Revalidated in 2004
- ASTM D6868
  - *"Specification for Biodegradable Plastic used on Paper and other Compostable Substrates"*
  - For packaging and food service items, made of plastic coated paper and board.

ASTM Specifications: Biobased Content

- ASTM D6852
  - *"Guide for Determination of Biobased Content, Resources Consumption, and Environmental Profile of Materials and Products"*
- ASTM D6866
  - *"Test Methods for Determining the Biobased Content of Natural Range Materials Using Radiocarbon and Isotope Ratio Mass Spectrometry Analysis"*

Food Waste Programs are Growing

- Pacific Northwest
  San Francisco
  - San Francisco
  - Portland, OR
  - Seattle, WA
- Northeast
  - Supermarkets in NJ & MA
- Midwest
  - Wayzata, MN
  - Boulder, CO
- Canada
  - PEI/NS Toronto suburbs

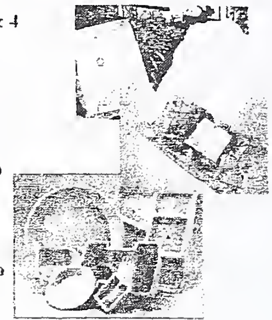


California

- Active food waste diversion efforts to achieve mandated 50% diversion goal
- Enacted Large Venue Recycling Law to promote recycling & diversion
- Enacted SB 1749 to minimize labeling confusion on plastic films

Interest in Compostables Continues to Grow

- 9 approved bag suppliers & 4 foodservice providers
- 2x 2003 levels
- Major companies see the opportunity
  - Heritage Bag
  - Poly-America (Husky Bags)
  - Fabri-Kal
  - Huhtamaki (Chinet)
- More in pipeline
- "Biobased Renewable" is a component for many



Labeling

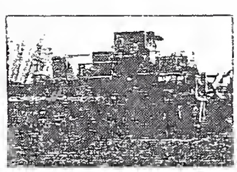
- Confusion still exists in consumer minds
- PE with additives claiming
  - Don't meet D6400 or D6868
  - "Compostable"
  - "Biodegradable in Landfills"
  - "Reduces Litter"
- "Biobased", "Renewable" & "Natural" = "Biodegradable"

Issues to Growth

BPI Biodegradable Products Institute

Compost Infrastructure Development

- Despite growth over past 15 years, it is still an industry in development
- Challenges
  - State regulations
  - "Commonality" of operations
  - LF Tip Fees
- NIMBY
- Lower solid waste concerns
- Bioreactors??



Lifecycle & Economic Benefits??

- Most biobased products will be higher priced than current materials.
  - Most important features: Performance and Price
- Disposal savings don't accrue to purchasers
- Education needed to quantify benefits of
  - Producing and using compost vs. disposal
  - Biobased feedstocks

Resistance from Recyclers

- All biobased are labeled =7 Other
- Contaminant to conventional resins in recycling
- 30+ states have laws dealing with resin coding
- Recommendation: Propose an exemption for "compostable" products to resin coding.

7

OTHER

Federal requirements still unclear

- Will "biobased" single use disposables, also need to be "compostable" and meet D6400 or D6868?
- If not, then
  - Likelihood for confusion increases
    - "biobased" = "biodegradable"
  - Non-compostable biobased applications will compete with materials like NatureWorks and Metabolix.
  - Non-compostable biobased applications suitable only for landfilling and incineration

Labeling

- Clearly identifying and communicating the benefits key to program success
  - Biobased
  - Renewable content
  - Compostable
- Labeling efforts should work together cooperatively

BPI Contact Information

- Tel: (01) 888-274-5646
- Fax: (01) 973-916-1911
- Email:
  - info@bpiworld.org
- Website:
  - www.bpiworld.org

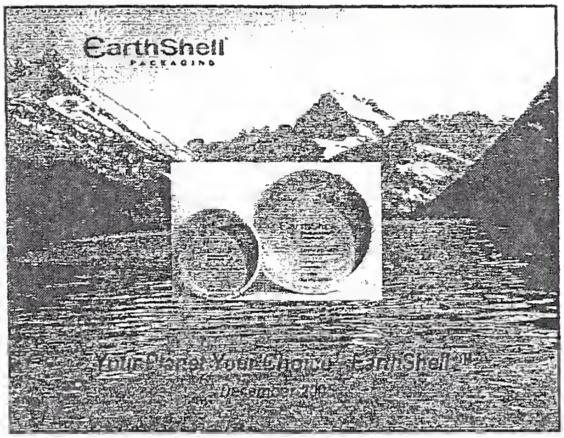
COMPOSTABLE

The proof is in the *LABEL*

Panel: Industry Perspectives: Ways to Move Forward

Earthshell

John Nevling and Cindy Eikenberg



Fundamentals of EarthShell Packaging® Brand Positioning and Identity

Environmental Profile

- Made from natural starches and abundant limestone
- Manufacturing process uses less total energy, less fossil fuel and produces lower greenhouse gas emissions
- Recyclable and biodegradable through composting
- Takes up less space in a landfill
- Life Cycle Inventory as a tool
- Environmental Group support

Performance

- Quality as good as or better than double laminated polystyrene, heavyweight paper and molded pulp
- Sturdy and rigid
- Microwavable
- Excellent insulation, grease and cut resistance
- Easy to stack, ship, store and use
- Performance proven with key customers, e.g., U.S. Dept. of the Interior, Sodexho, EPA, Aramark, Wal-Mart, etc.

Cost/Price

- Products priced at a small premium (4%) to high end foam (double laminated) products and less than molded pulp
- Alternate raw materials vs petroleum based plastic and foam plates and laminated paper plates translate to cost stability
- Favorable and more stable raw material costs allow for immediate price competitiveness
- Premium performance justifies premium price
- Environmental advantages further justify premium price

What is EarthShell?

- New composite material combining organics with inorganics

Annually Renewable Starch

+

Natural, Abundant Limestone, Biodegradable - Compostable polymers

=

EarthShell Packaging

Quality and Performance

- Premium quality
- Sturdy and rigid
  - Stands up to high stacking of heavy foods
  - Confidence to carry with one hand
- Easy to stack, ship, store and use
- Excellent insulation
  - Comparable to polystyrene and superior to fluted paper

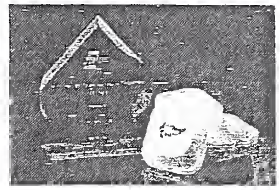
Quality and Performance

(cont.)

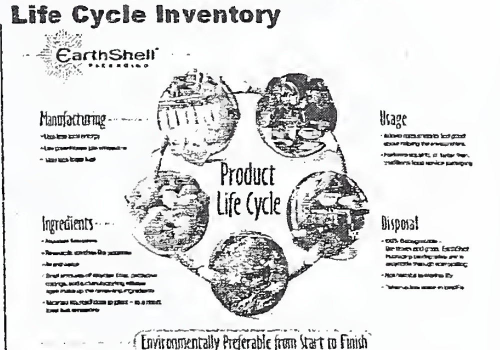
- Microwavability
  - Plates and bowls
    - Reheat foods
    - Will not leak or soak through
- Upscale look and feel
  - Attractive, natural white color
  - Strength gives feel of high quality

Awards

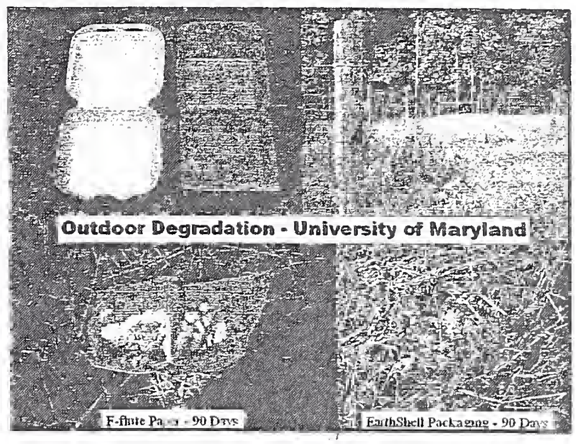
- Best of the Best competition: Foodservice & Packaging Institute - First Place, Best Foam Packaging Category: EarthShell Hinged-Lid Sandwich and Salad Container
- 15th Annual DuPont Awards for Innovation in Food Processing and Packaging - Silver Award



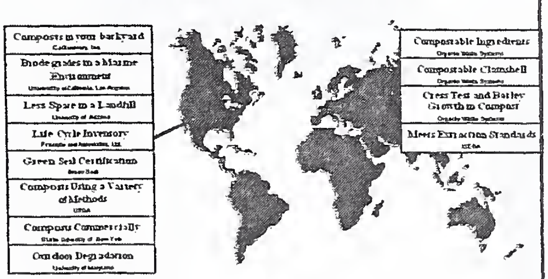
Environmentally Preferable - Life Cycle Inventory



Life Cycle Inventory includes the environmental loadings from raw material extraction and production, manufacturing, use and final disposal.



The Environmental Profile is Confirmed by Independent Organizations



Environmental Support

- Defenders of Wildlife
- Friends of the Earth
- World Resources Institute
- Green Seal
- U.S. EPA
  - Environmentally Preferable Purchasing Guidelines
- National Fish and Wildlife Foundation

Government Influence

- Executive Order 13101 directing the government to consider the environmental attributes of a product during purchasing

Environmental attributes + Price + Performance = EPP

- Biobased Products (Title IX of the Farm Bill)
  - Government to preferentially purchase biobased products
  - USDA to create criteria for biobased products by category
  - USDA to create a list of biobased products and certify products as biobased
  - Biobased products specially identified in government purchasing systems (GSA)

USDA UNITED STATES DEPARTMENT OF AGRICULTURE

Government - Direct Involvement

- Environmental Studies
  - Full scale cafeteria use and composting project - USDA, DOI, EPA, GSA, 1999.
- Government Guidelines
  - Model contract language
  - Green buying guidelines
  - Comments on legislation

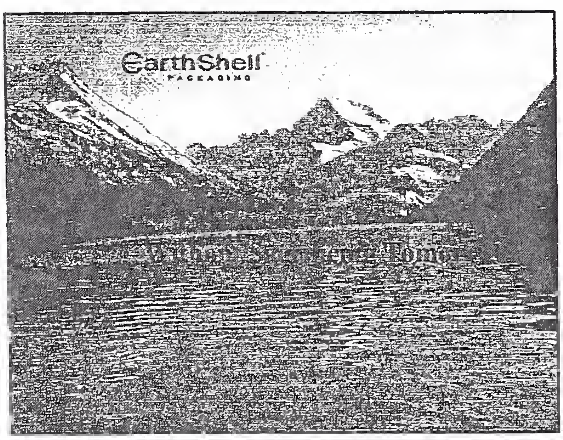
Government - Direct Involvement
(cont.)

- Sales focus
  - DOI
  - EPA
  - USDA
  - DoD
  - Special events
- Government Buying Programs
  - Environmentally Preferable Purchasing
  - Biobased Products - Title IX

Manufactured Under License

- EarthShell Corporation is the technology company
- Renewable Products, Inc. (RPI) is the licensee that manufactures, sells and distributes EarthShell Packaging products

ReNewable PRODUCTS, INC.



Customer Perspectives on Biobased Packaging and Cafeteriaware Needs and Opportunities

Ken Letherer
Whole Foods Market

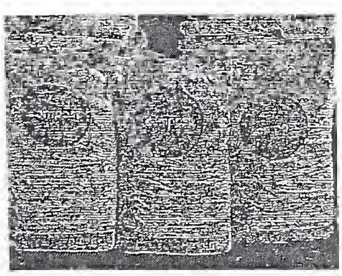
Customer Perspectives
on BioBased Packaging & Cafeteria Needs and Opportunities

Ken Letherer **Whole Foods Market**

Customer Perspectives

- Biobased Packaging
- Cafeteriaware Needs
- Opportunities

GOAL:
Create a full circle waste diversion composting program



Core Value:
We Promote Environmental Stewardship

- We see the necessity of active environmental stewardship so that the earth continues to flourish for generations to come. We seek to balance our needs with the needs of the rest of the planet through the following actions:
- Supporting sustainable agriculture. We are committed to greater production of organically and bio-dynamically grown foods in order to reduce pesticide use and promote soil conservation.
- Reducing waste and consumption of non-renewable resources. We promote and participate in recycling programs in our communities. We are committed to re-usable packaging, reduced packaging, and water and energy conservation.
- Encouraging environmentally sound cleaning and store maintenance programs

Retail Operations:

All this beautiful food needs a stylish container to ride home in!

Expense of Packaging

- We currently have **180 stores** worldwide.
- Our goal is to have **300 by the year 2010.**
- **$10 billion in sales** annually by 2010.
- Worldwide cost of packaging by 2010 will be **$60,000,000.**

Concerns and Challenges

- We must be able to **leverage our buying power.**
- We have a commitment to not support **GMO's** into our waste stream or our products.
- Crop source and true cost matters.
- Willing to look at reusability that is also **compostable.**
- Expense is a huge concern. We must **balance** all of our stake holder groups being a publicly traded company. This means no premium pricing!

Compostable vs. Biodegradable

- Most of our stores are on a composting program.
- Continued challenges in finding haulers and composting facilities in close proximity to all locations.
- Urban locations are more challenged than suburban.
- "Biodegradable" claim is like "Natural" claim. It doesn't mean much even if it is true.

1 of 2

Compostable vs. Biodegradable

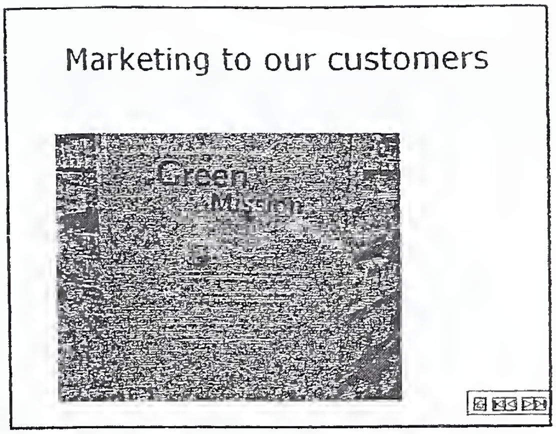
- Some compostable plastics are co-polymers that are blended with hydrocarbons and still get certified compostable.
- Third party certifiers have symbols that do have some recognition, yet the word compost or compostable probably make the most sense.
- Using the # 7 triangle symbol for compostable plastic is next to useless. It confuses as much as it clarifies. 7 means not the first 6 which are specific hydrocarbon molecules.

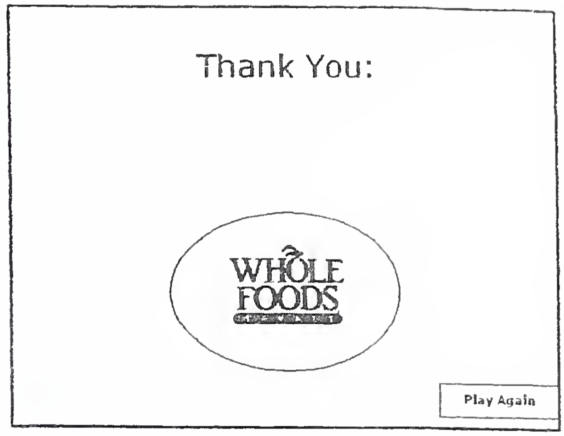
How about using the number 0 for compostable plastics that want to use a number. 0 would imply zero waste.

1 of 2

More Retailing Opportunities:

- In the USA we throw away enough plates and cups to have a picnic for the entire world 6 times a year.
- Whole Foods Market sells cafeteriaware to our customers every day. We are willing to look into a private brand label for these goods.
- Other retailers like Wal-Mart, Costco, Harris Teeter etc., are increasingly getting into selling natural and organic products.


Marketing to our customers
Green
Mission


Thank You:
WHOLE
FOODS
Play Again

Composting Food Waste and Food Service Products

Heather Davies
Office of Environmental Policy and Compliance
U. S. Department of the Interior

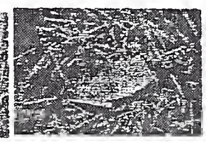
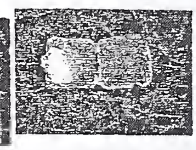
Composting Food Waste and Food Service Products

A Pilot Project of the
U.S. Department of the Interior
and
The EarthShell Corporation

EarthShell Corporation

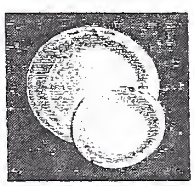
Findings

- Biodegrades in compost & marine environments
- When (if) landfilled, uses 1/3 space of fluted paper and 1/8 volume of polystyrene packaging*

The problem was...

- The product we found could not be bought
- It was not available commercially
- Still in the "R&D" stages



The Beginning of a Partnership

- Our objectives
- EarthShell
  - To test their product in a "real life" environment over a long period of time
- DOI
  - An alternative that had no, or low, negative impact on the environment
  - Create a shift in thinking for all of our food service contractors, workers and patrons.
  - Set a precedent that could be used elsewhere

Earth Day,1999 - Earth Day, 2000

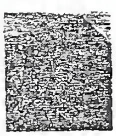
- Pilot ran for full year
- Totally replaced all 9" plates & 6" bowls
- Used biodegradable trash bags
- Redesigned source separation area

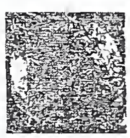
Earth Day (Continued)

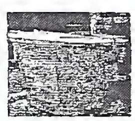
- Developed a plan to educate patrons
  - Large educational display
  - Announcement memos
  - Splash screens
  - Posters & examples in recycling area
  - Table tents
- Orientation for cafeteria and cleanup staffs
- Solicited feedback
- Both partners issued press releases

Key Component – Composting

- USDA Agricultural Research Service
- Windrow, static pile and in-vessel
- Tested with a variety of green waste







Composting (Cont.)

- Contamination a problem due to:
  - Non-compostable cafeteria items still in use
  - Some thought all polystyrene had been changed

The Results Are In!

- Cafeteria workers report satisfaction with the product
- Used for hot and cold items
- Successfully used in steamer for reheating
- Manager reports increase in business.
  - 27% increase in plate usage (Related?)
  - Good food and good things for environment!

More Results...

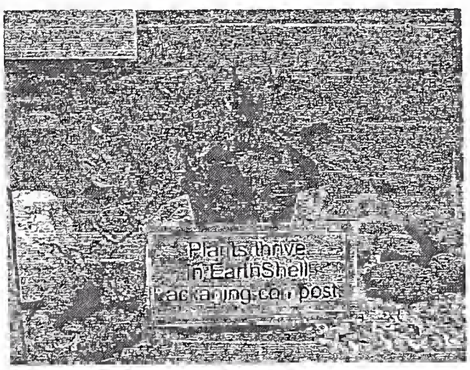
- Patrons liked the idea of the project
- And, they were pleased with the product
  - Good in-house comments; wanted to do more
  - Calls and email from all over the U.S. and beyond

Composting a Success

- Composting tests were very successful
- Diverted 24% of cafeteria waste
- Earth Shell product broke down very well
- Carryout trays and napkins, too
- Final tests as growing medium completed
- Chemical analyses on mature compost

In Summary...

- Food residuals account for a large part of our waste stream
- We can and should look for greater opportunities to "green" our food service operations
- Compost!
- Support the development of new, bio-based, compostable products



Appendix E

ABSTRACTS

Presented at the December 8, 2005 Round Table, Provided as an on-site handout

Provisions Of The Federal Biobased Products Preferred Procurement Program And Progress In Implementation

Marvin Duncan, Senior Agricultural Economist
Office of Energy Policy and New Uses, USDA

Statutory authority for the Federal Biobased Products Preferred Procurement Program (FB4P) was included in the Farm Investment and Rural Security Act of 2002 (FSRIA). This program will provide for procurement preference by Federal agencies for biobased products that have been designated and qualified by rule making under the FB4P. The Office of Energy Policy and New Uses (OEPNU) within USDA is charged with implementing this program. OEPNU has identified about 100 items (generic groupings of products) to be designated by rule making. Federal agencies are required to procure products designated by this program, unless the products are not readily available, are excessively expensive, or cannot meet the reasonable performance standards of the procuring agency.

The final rule establishing the guidelines for operation of the program were published in the *Federal Register* in January of 2005. The first of several rule designating items for preferred procurement is expected to be published as a final rule about the end of calendar 2005. Three additional designation rules of ten items each are in various stages of drafting and clearance within USDA. Additional designation rules will be published as rapidly as OEPNU is able to gather the technical information required to support designation of items.

FSRIA also provided for a voluntary labeling program that will permit qualifying biobased products to carry the U.S.D.A. Certified Biobased Product label and logo. The proposed rule to establish this program is in clearance within USDA.

Finally, FSRIA provided for a model procurement program to provide education and outreach to Federal agencies regarding their responsibilities to purchase biobased products under this program. USDA's Office of Administration is developing this program, which will be carried to all Federal agencies in cooperation with the Office of Federal Procurement Policy of the Office of Management and Budget.

State of US Food Composting – Institutional and Municipal Scales

Nora Goldstein
BioCycle
The JG Press, Inc.

BioCycle conducted its first nationwide survey of food residuals composting projects in the U.S. in 1995. At the time, there were 58 full-scale and pilot projects processing commercial, institutional and/or industrial food residuals streams. Several years later, in 1998, the *BioCycle* nationwide survey identified 187 full-scale composting operations, 37 pilots and 26 projects in development — for a total of 250. Of the full-scale projects, 54 were processing the full complement of institutional, commercial and industrial (ICI) feedstocks; 91 were composting on-site at institutions and 42 were composting a combination of industrial, agricultural and municipal food residuals streams.

Ten years after the first survey was conducted, there are most likely hundreds of on-site composting projects at institutions, including colleges and universities, correctional facilities, elementary and secondary schools, resorts and military bases. Some use conventional windrows, while others use vessels designed for on-site composting. The number of centralized facilities composting a range of ICI organics has not grown at the same pace. There is a concentration of these projects on the West Coast, and a sprinkling throughout the rest of the United States. Economics, collection logistics and project permitting have all factored into the slow pace of facility development.

Over the past ten years, a number of states have developed, or funded development of, tools to advance the diversion of food residuals. These include GIS mapping of generators and processors, and manuals for source separation at grocery stores, restaurants and other establishments. From a public policy standpoint, there have been no incentives at the federal level for food residuals diversion. More incentives have been presented at the state and local government levels.

This paper will provide a birds-eye view of operating projects, incentives and disincentives, and the role that biodegradable products play in increasing the diversion of food residuals and soiled paper from disposal.

USDA Cafeteria Pilot With Biobased Products

James M. Green
Program Manager, Biobased Procurement
USDA/DA/OPPM

Patricia D. Millner, Research Microbiologist
US Department of Agriculture, Agricultural Research Service,
Beltsville Agricultural Research Center

Rosalie E. Green, Senior Recycling Specialist
SEEAssociate with USEPA, Office of Solid Waste

Randy Townsend,
US Department of Agriculture, Agricultural Research Service,
Beltsville Agricultural Research Center

This presentation will discuss USDA's overall concept and expectations for the pilot, operational strategies, costs, outcomes and lessons learned.

The Pilot was conducted for a period of three month in USDA's small cafeteria in the Whitten building. This venue gave USDA a more controlled environment that would allow for quick identification of problems and increased ability to correct them in a more effective, less intrusive manner.

During pilot, 33,426 patrons were served. In generally patrons easily accepted the change from the typical Styrofoam and plastic ware to products manufactured from biobased feedstock. But, as expected there were those patrons that did not like the change. In fact, we receive fewer that 150 negative complaints. Cafeteria operations and services were not impacted by the change to biobased products.

The pilot included a wide variety of biobased products. See list below. These products, along with food scraps from the cafeteria and leaves that were added at the composting sight, were then composted by the Agricultural Research Service (ARS). We are currently waiting for the final outcome of the composting activities in order to determine the level of savings to the Government.

Biobased products for the pilot cost $14,367.42 with total freight charges of $952.83. USDA's part of the overall cost was 66% or $9482.50 and the cafeteria contractor's portion was 33% of or $4884.92

The team that conducted the pilot was very diverse. It consisted of representatives from the Department's Departmental Administration, ARS, Agricultural Marketing Service, and the current contractor for the USDA cafeteria. In addition to USDA representatives, representatives from the Environmental Protection Agency also participated.

We feel that the pilot was an overall success. We were able to try out many products that will impact the development of the department's new food service solicitation.

Table 1. Items Used in the 2005 USDA Whitten Cafeteria Biobased Product Pilot Project

7" Sturdy Bagasse Plates	Sugarcane, composts in 45 days
9" Sturdy Bagasse Plates	Sugarcane, composts in 45 days
12 oz Cold Cup - Made from Corn	Corn, composts in 45 days
20 oz Cold Cup - Made from Corn	Corn, composts in 45 days
24 oz Cold Cup - Made from Corn	Corn, composts in 45 days
Flat Lid with Straw Slot for 12/20 oz - Made from Corn	Corn, composts in 45 days
Flat Lid with Straw Slot for 24 oz - Made from Corn	Corn, composts in 45 days
9" x 12" Tray - 99.9% Recycled Content - Biodegradable	Recycled paper, composts in 60 days
2-Cup Carrier - Recycled - Biodegradable	Recycled paper, composts in 60 days
12 oz Bagasse Bowl	Sugarcane, composts in 45 days
32 oz Clear Cylinder Food Container - Made from Corn - No Hot Foods	Corn, composts in 45 days
16 oz Hot Food Container - 99.9% Recycled Content	Recycled paper
12 oz Hot Food Container - 99.9% Recycled Content	Recycled paper
8 oz Hot Food Container - 99.9% Recycled Content	Recycled paper
16 oz Clear Cylinder Food Container - Made from Corn - No Hot Foods	Corn, composts in 45 days
8 oz Clear Cylinder Food Container - Made from Corn - No Hot Foods	Corn, composts in 45 days
Lid for Clear Cylinder Food Container - Made from Corn	Corn, composts in 45 days
12 oz Bio-Coated Hot Cup - Biodegradable	Recycled paper with vegetable-based coating, composts in 60 d
16 oz Bio-Coated Hot Cup - Biodegradable	Recycled paper with vegetable-based coating, composts in 60 d
Hot Cup Jacket - Recycled - Biodegradable	Recycled paper, composts in 60 days
12 oz Recyclable Plastic Water Cup	Plastic, not compostable (see 12 oz corn cup)
8" Thin Straw - Made from Corn	Corn, composts in 45 days
Corn Fork - Not for Hot Food	Corn, composts in 45 days
Fork - Heat-stable	Plant cellulose and limestone, composts in 120 days
Corn Spoon - Not for Hot Food	Corn, composts in 45 days
Spoon - Heat-stable	Plant cellulose and limestone, composts in 120 days
Corn Knife - Not for Hot Food	Corn, composts in 45 days
Knife - Heat-Stable	Plant cellulose and limestone, composts in 120 days
Plastic Lid for 16 oz Hot Food Container	Plastic, not compostable
Plastic Lid for 8/12 oz Hot Food Container	Plastic, not compostable
Black Plastic Lid for 16 oz Bio-Coated Hot Cup	Plastic, not compostable

Case Studies: Keys to Successful Large Institutional and Municipal-Scale Food Composting

Keys to Success of San Francisco Food Composting & Compostable Product Ware Use

Jack Macy
Commercial Recycling Coordinator, SF Environment
City and County of San Francisco

The City and County of San Francisco, in partnership with Norcal Waste Systems, its exclusive service provider, developed and implemented a citywide source-separated composting program of food scraps, plant trimmings and other compostable products. Compostables are collected from residents and commercial/institutional generators, hauled to Norcal's regional composting with the resulting compost used by organic growers and sold to farms, vineyards, golf courses and landscapers, who close the nutrient recycling loop by selling their products back into the city. San Francisco's commercial food composting collection started as a demonstration in 1996 and its residential composting started citywide roll-out in 2000 after 2 ½ years of ongoing pilots. The composting program now serves 150,000 households and 2000 businesses and institutions and diverts more than 300 tons per day of organics consisting mostly of food and related food service ware and packaging. This presentation will review the following keys to commercial/institutional food composting program success:

1. Establish policies and goals to drive programs, achieving high diversion and greater sustainability.
2. Create a beneficial public/private partnership with mutual goals.
3. Provide financial incentives to both generators and service providers to achieve goals.
4. Target a wide range of food and other compostables, starting with easier to recover material.
5. Avoid start and stop pilots, test and demonstrate programs and expand and modify as needed.
6. Design a clear color-coded sorting, collection container and image graphic education system.
7. Give generators options for containers and collection service, including up to daily service.
8. Develop composting and recycling programs to minimize contamination and maximize recovery.
9. Eliminate disposable food service ware through using reusable, compostable or recyclable products.
10. Require that food service products (e.g., bags, cutlery, clear cups, deli containers) be independently certified compostable (e.g., BPI) or made of plant fiber in order to be accepted for composting.
11. Get management buy-in at all levels to make program routine and a basic job responsibility.
12. Provide on-site program set-up assistance, including sorting containers, signage, and multi-lingual staff and management training to address constraints (e.g., space) and any concerns (e.g., mess) and make the program as convenient as possible.

13. Monitor contamination and give quick feedback and assistance to ensure quality control.
14. Create high quality compost, such as certified for use by organic growers, and close the loop with resulting produce or other products being used by program generators.
15. Provide recognition for excellent program participation and results and get good press.
16. Improve collection, processing, and product quality and diversity for sustainable benefits.

Case Studies: Keys to Successful Large Institutional and Municipal-Scale Food Composting

In-Vessel Composting
The Wright Way

Bob Kerlinger, President
Mid-Atlantic Composting Association

There are many challenges to consider and overcome when designing a food waste to compost system. The main one of course is control of odors and then project cost, transportation options, maintenance and operating cost, what type of compost system will work best for your situation, space needed, and the list goes on and on.

There are also many reasons why you would want to seriously consider the in-vessel option.

1. Because there is air continuously being pumped through the system and then through a biofilter, there is no odor and the only bi-products of the process are heat and moisture.

2. The system is very flexible size wise and can be built to handle from 600 pounds a day to 30 tons per day. For larger inputs, additional units can be added.

3. It is a continuous flow-through system, which gives the operator the flexibility to put in more or less feedstock, as the daily situation requires.

4. Operating cost is very low, as the system requires very little energy and manpower to operate.

5. Maintenance cost is very low because the entire inside of the system is made of stainless steel.

6. Leachate recirculation eliminates ground water contamination

Refer to our website, **www.wrightenvironmental.com**, for additional information.

In-Vessel Systems, City of Hutchinson, MN, & Schools

Jim McNelly, President
Renewable Carbon Management

In 1999, The City of Hutchinson, Minnesota was one of the first communities in the United States to organize a program for collection and containerized, in-vessel composting for source separated food scrap organics. This dual compartment compactor collection program is significant in that the feedstocks were derived from not only residences, but from commercial and institutional generators as well.

With initial resistance to the cost of compostable bags certified by the US Composting Council, the city had mixed results from using lower cost chemical and photo-degradable bags. The volume of non degraded plastics posed problems in the form of fugitive plastic debris blowing around the composting site and excess contamination in the oversize material after screening.

In addition to non-degrading "degradable bags", the plastic volume in the compost was compounded by several other types of plastics. These included paper diaper back-sheets, food wrappers, condiment cubs, juice boxes, plastic straws, and LDPE bags full of pet feces and table scraps. The pre-consumer industrial, commercial and institutional organics were relatively clean from plastics has there was an effective education program as these generators typically used bins instead of bags for organics. However, the post consumer organics derived from meal services at hospitals, schools and large businesses were heavily contaminated with food wrappers and condiment containers, even to the extent that the collection program at the high school was abandoned. In addition, these waste streams were contaminated with other materials such as metal cutlery and broken drinking glasses.

Two years before the start of the household organics program, the city had initiated an aggressive home composting program and municipal organics drop off system, eliminating the separate collection of yard trimmings. The city did not desire to resume leaf and grass clipping collection, expressing a desire to process yard trimmings separately from household organics in order to have a major portion of the finished compost stream less contaminated, separate from the more contaminated household organics. This plan, however, was met with resistance from citizens as they invariably included leaves, grass and yard debris in the curbside household organics containers.

The net result of the project was that such a program is feasible in reducing the volume of land filled waste but a challenges was encountered in the area of public education, resulting in varying degrees of contamination with non compostable materials. The city's in-vessel containerized composting was capable of processing and composting the organics, but the net result of contamination in the compost as well as in the oversize material has led the city to consider further processing of the compost using density and air separation methods typically reserved for mixed waste composting.

An Economic Analysis of Composting

Nadine H. Davitt
Organic Materials Processing and Education Center
The Pennsylvania State University

Economic analysis provides a means for establishing costs of production and profitability. Determining costs is a step process that begins with identifying types of costs, labor productivity and allocation of labor/equipment/supplies to specific tasks. While an employee is present and paid for eight hours of work, actual productivity is less due to travel time, breaks, and time associated with start up/end work day. The hourly labor rate needs to reflect costs associated with non-productive labor hours, fringe benefits and replacement labor for vacation/sick leave. Establishing the cost of equipment includes: estimating the life of the machine, accounting for principal, interest, routine maintenance, fuel and major overhauls. Labor and equipment allocation by task identifies the actual cost of each step in a process and can provide critical information when evaluating profit margins. Scenarios illustrating how to establish labor and equipment costs and net income per windrow will be discussed. The presentation will outline considerations for establishing costs of production and discuss how to collect/generate data needed for conducting a cost analysis. The steps presented will be applicable to any operation with source specific data.

New York State Correctional Facilities Composting Operations

James I. Marion
Resource Management Director
NYS, DOCS

This presentation will include the scope and technologies of Organic Waste composting in the New York State Department of Correctional Services.

The program includes 32 composting sites serving 56 of 70 Correctional facilities in the State system with a population of 65,000 inmates and 30,000 staff. During Fiscal Year 2005-06 approximately 14,000 tons of food and wood waste will be processed with an avoided disposal cost of $2.2 million.

Technologies include; open windrows, covered windrows, aerated bay and in-vessel systems. Ancillary operations include mixing, screening and horticultural applications of finished products. The prison system also composts cattle mortalities from 10 prison farms and slaughterhouse waste from 600 animals per year.

The discussion will compare differing technologies for product quality, capital expense and site specific requirements. Product nutrient and agronomic values will be offered.

The New York DOCS has piloted three different biobased products for service ware and waste bags. The results have all been such that no biobased products are now in use in the system for a variety of performance and economic reasons.

Biobased Products Development, Supply, and Procurement: Meeting Quality Standards and Product Demand

Panel: Industry Perspectives: Ways to Move Forward

Biobased Products: Opportunities and Issues for Growth

Steven A. Mojo, Executive Director
Biodegradable Products Institute

BPI Background

Current Status for compostable products

1. Appropriate Standards/Specifications for compostable products
   a. ASTM D6400: Specification for Compostable Plastics
   b. ASTM D6868: Specification for Biodegradable Plastics on Paper and other Compostable Substrates. (Similar to EN 13432)
   c. ASTM D6852-02 Standard Guide for Determination of Biobased Content, Resources Consumption, and Environmental Profile of Materials and Products
   d. ASTM D6866-05 Standard Test Methods for Determining the Biobased Content of Natural Range Materials Using Radiocarbon and Isotope Ratio Mass Spectrometry Analysis

2. Large Scale Source Separated Composting Programs are coming on line
   a. San Francisco & Pacific NW
   b. NJ & Mass (commercial and preconsumer materials)
   c. Canada: Toronto suburbs; PEI and NS
   d. Large venue recycling law in California to promote diversion
   e. Industry still under development

3. Interest in compostable products growing rapidly in US and Canada
   a. 9 bag manufacturers and 4 vendors of food service items
      1. Double vs. 2003
      2. All meet ASTM D6400 or ASTM D6868
   b. Product compositions span the range from little or no renewable content to 100% renewable.
   c. Major suppliers, such as Heritage Bag; Poly-America & Fabri-Kal
   d. More on the way, including traditional paper products and other forms of biomass.

4. Labeling & Confusion

   a. Labeling laws in California for plastic bags
   b. Some manufacturers are still mislabeling products of PE (and other commodity resins) as “biodegradable”, “compostable” or “biodegrades in landfills” because they contain additives
   c. Significant consumer misperception that
      1. biobased” or “natural” = “biodegradable/compostable”
      2. “petroleum based or synthetic”   “biodegradable/compostable”

Issues to Growth:

1. Composting and source separated collection infrastructure need further development and expansion
2. What are the lifecycle benefits of food scrap diversion, compost and composting?
3. Economic benefits of diversion programs are not apparent to purchasers of foodservice operators
4. Biobased resins face resistance from recycling community
5. Labeling and USDA regulations for “biobased” products not yet finalized. Potential to increase confusion.

Earthshell

John Nevling
Earthshell Corporation

and

Cindy Eikenberg
Marketing Communications Manager
Earthshell Corporation

1. Introduction to EarthShell

2. Federal Procurement Guidelines – EPP and Biobased Products – How EarthShell Fits

3. EarthShell's Continued Work with the Government – EarthShell/USDA CRADA

4. Current EarthShell Products and Availability

Biodegradable Cutlery Products and the True Composting Link

Li Nie
MGP Ingredients, Inc.

MGP ingredients has developed filled composite resins for disposable products for cost reduction, enhanced properties, and enhanced biodegradation. Product applications include films, thermoformed packaging shells and food service trays, molded articles. We will give some discussion about the pros and cons of starch filled system, formulation, compounding, molding, properties, Bees analysis, composting result for injection molded cutlery.

Biodegradability is a material property that has its own functional applications. Compostability has to do with organic waste management. Biobased product has to do with sustainability and its economic viability. Each one has its own driver for market growth. It is also necessary to make the connection between biodegradability and compostability.

Plastic products in organic waste are not the problem until organic waste is composted. Without municipal organic waste composting, there is no strong perceived need for biodegradable and compostable plastics in organic waste management. Biodegradable plastics is not the driver for organic waste management. Organic waste management by composting demands mixed in plastics be compostable. Compostability of biodegradable products can show its functional benefit for ease of sorting with organic waste and not messing up the organic humus after composting. Compostable products can also show benefit of overall reduction of waste that has to be managed by other means.

As an industry involved in this side of the business, we believe strongly the role government plays in implementing sound policy and promoting responsible management of solid waste. Society has to reject the way of improper part of landfilling practice by burying organic waste. Society has to learn from the practices of sewage water treatment, animal farm waste management, yard waste management, farmer's way of handling to see what can be done with household organic waste management for urban dwellers. It is government's job to implement sorting program and compostable program for organic waste and compostable waste. It is good for our future. It creates new businesses and jobs. Composting is the most important driver for expanding demands for compostable products by making biodegradability a functional requirement and benefit instead of just perceived environmental benefits.

Panel: Customer Perspectives on Biobased Packaging and Cafeteriaware Needs and Opportunities

Army and Navy Environmental Research Programs for the Reduction of Solid Waste

Jo Ann Ratto, Materials Research Engineer
U.S. Army Natick Soldier Center
Nanomaterials Science Team

Army, Air Force, and Marine Corps consume approximately 46.6 million operational rations each year generating 14,117 tons of packaging waste. Due to the operational requirements for combat rations (i.e. air-droppable, minimum three year shelf life at 80 F, six months at 100 F), the rations must be packaged appropriately to meet these requirements. Shipping containers fabricated from fiberboard and coated paper are necessary to safely transport and store food and other military items for all warfighters including sailors on Navy vessels. This new study which will start this fiscal year through support of the Strategic Environmental Research and Development program will produce new lightweight fiberboard materials, biodegradable polymer-coated fiberboard and paperboard that can be converted to a valuable byproduct, compost. These environmentally friendly materials are expected to meet the operational and performance requirements of combat ration packaging. Composting trials will be ongoing throughout this program to determine how quickly new coated paper and fiberboard formulations biodegrade and if these packaging materials used in combination with other waste (e.g. food waste, grass clippings, leaves, bark etc.) can generate a compost product that could be ultimately sold or given away as a soil conditioner to benefit the local community. Previous research studies involving biodegradable materials, their processing and characterization for the Army and Navy will also be mentioned.

Biodegradable/Compostable Plastics

Ramani Narayan
Department of Chemical Engineering & Materials Science
Michigan State University

Biobased and biodegradable plastics can form the basis for an environmentally preferable, sustainable alternative to current materials based exclusively on petroleum feedstocks. These biobased materials offer value in the sustainability/life-cycle equation by being part of the biological carbon cycle, especially as it relates to carbon-based polymeric materials such as plastics, water soluble polymers and other carbon-based products like lubricants, biodiesel, and detergents.

Biopolymers are generally capable of being utilized by living matter (biodegraded), and so can be disposed in safe and ecologically sound ways through disposal processes (waste management) like composting, soil application, and biological wastewater treatment. Single use, short-life, disposable products can be engineered to be biboased and biodegradable. The need for such products to be fully biodegradable in a defined time frame in the selected disposal infrastructure as opposed to degradable or partially biodegradable is reviewed. In particular, data is reviewed to show that degraded polyolefin fragments can cause irreparable harm to the environment. Emerging ASTM and International consensus standards on biobased content, and biodegradability is presented.

Customer Perspectives on Biobased Packaging and Cafeteriaware Needs and Opportunities

Ken Letherer
Whole Foods Market

Whole Foods Market has been working on creating a full circle composting program. We recently had a store in California go through an entire day and not generate a single piece of trash that would end up in the landfill. We will discuss the challenges and continued opportunities involved in making this happen.

We will disclose our business philosophy of environmental stewardship as it is one of our company's core values.

Our purchasing needs for biobased packaging will come close to 60 million dollars in the next four years. With this need comes many concerns and challenges that we will put forward in this round table discussion. One of the concerns is compostable vs. biodegradable.

There are other retailing facility opportunities including private label selling of cafeteriaware to the general public.

Panel: Compost Product Users, Stakeholder Education and Information

What the Horticulture Industry Needs in Regards to Composted Products

Marc Teffeau
Director of Research and Regulatory Affairs
American Nursery and Landscape Association & the Horticultural Research Institute

Use of composted organic products in the production of nursery and floricultural crops has become an established and accepted industry practice over the last 20 years.
The three most common applications of composted materials in the industry are:

1. Application, as a soil amendment, in the production of field grown nursery stock and as a mulching material for weed control.

2. Use as a substrate component in the production of container grown herbaceous perennials, woody plant material and annual flowers.

3. As mulch and also a soil amendment in landscape planting establishment and maintenance.

Each of the final end users of a composted product requires specific quality and characteristics for that product. No matter what the final end use of the material, however, **Quality** and **Consistency** are the two issues that impact on composted material uses in the production of ornamental crops. Quality, in terms of the biological, chemical and physical characteristics of the composted product and Consistency in terms of how well a standard of product is maintained over time and its market availability.

Extensive research on the characteristics of both plant and animal source composts and use in specific ornamental cropping systems has given the horticulture industry a baseline from which to establish the most appropriate uses of composted products. The introduction into the composting stream of new sources of compost feedstocks, such as cafeteria-ware and solid waste based products, represent a new opportunity to explore the appropriate use of these materials in plant production. Quality and consistency of these products along with a research based understanding of appropriate uses will drive the horticultural industry marketplace acceptance of these and any new composted materials.

Education and Information: Greenscapes, Roof Gardens, Rain Gardens, Compost Berms, Stormwater Management

Rosalie Green
Office of Solid Waste
US Environmental Protection Agency

The prospect for food composting for Federal facilities in the Washington, D.C. area is almost accomplished, that is, there has already been two successful pilot programs: one several years ago at the Department of Interior cafeteria on 18th street , N. W. and the second completed this year at the USDA Whitten Building cafeteria. The success in both cases rested on:

1) training sessions with the employees who prepared the food and the employees who served and discarded the food;
2) preparing educational materials designed with EPA, OSW for customers of the cafeterias explaining which tableware/food waste to place in the vividly labeled receptacles and what the purpose of the collection for compost production would be....plus a clear explanation of what compost was and what compost was not (handout entitled "Compost: what is it?; and, "what's it to you");
3) monitoring of customers and staff for at least the first week to answer questions and watch disposal of compostables;
4) pick up and transportation was scheduled. Some Federal agencies have trucks and drivers available; and,
5) The conversion from food waste, soiled paper, and biodegradable grain-based tableware to organic, high humus, STA-certified compost was able to occur only because USDA had a compost research facility directed by Dr. Millner at Beltsville, MD., as part of their 600 acre campus. The compost equipment is suitable only for small compost research volumes.

The only reasons that a Federal food composting is not now in progress are:

1) more staff;
2) official ,, information coordination and distribution of results with EPA, OSW;
c) a few pieces of larger equipment;
d) 50 acres on the outside edge of USDA's 600 acres adjacent to a state road. The last reason is the most important.

My presentation on Green Roofs will highlight one important use of compost. Some of the larger Green Roof programs such as Portland.

Oregon's Eco-roof uses 1/3 compost, 1/3 soil, 1/3 perlite (or expanded mineral material) as the growth medium for their Green Roof Program. Green Roofs are a matter of national importance since they can save ½ of a building cooling/heating, therefore, saving energy and reducing greenhouse gases (GHG); retaining an average of 60% of stormwater in plants and growth media, and many other benefits.

Appendix F

EVALUATION SUMMARY

Food and Biobased Cafeteriaware Composting for Federal Facilities in Washington, DC

1. **What are the positive aspects of the meeting?**

Multi-stake holders in one meeting
Open panel discussions
Opening, sharing of ideas and good scientific discussion
Good cross section of government, producers and users
Panel discussion and Q&A
Good presentations
Advancing the dialogue
Great content, speakers; thank you—very informative
Drawing together of wide variety of stakeholder, vendors, practitioners, regulators, researchers, government
A lot of activities on composting
A good mix of people, ideas, expertise, and viewpoints. Presentations covered the many facets of the problem.

2. **What are the negative aspects of the meeting?**

Too short for real follow up; upload presentations prior to event
Not enough time for speakers or time between the speeches for conversations and questions
Not enough time to network; not sure what next steps will be to deal with identified issues
Follow up will be key
Would like list of attendees
Perhaps too broad coverage but good way to "smoke out" issues
Content should have been divided over 1 ½ days...
Way too short time frames for presentations; need at least ½ hour per speaker; need 2 to 3 days for interchange; what is the action plan from the gathering?
Lack of people on landfill business
Time management could have been better. It was a packed agenda with little margin for error time-wise. There were a lot of presentations, without much time for interaction and questions. The discussion periods were valuable, but time for questions after each presentation would have been useful. There wasn't enough time for "mingling" and networking—several people slipped away before I had a chance to chat with them, and I left early as well.

3. **Should a follow-up symposium/workshop be held in 2006?**

Yes_xxxxxx!!x_____ No__x_____

Yes, if there has been sufficient progress/change to warrant one. It might be useful to focus a follow-up on just a couple of issues.

4. **If Yes, when and where?**

B/W area is ok; Central US better...Chicago?
After publishing of new grouping
Depends upon objectives and Issues
Same place in November, early December
DC are is good to include government drivers of policy changes
Every few years
Same location is ok; site with more room might be better. It might be helpful to start right after lunch one day and finish at lunch the next—that might cut down on the number of late arrivals/early departures.

5. **If yes, potential topics/speakers should be considered**

Working programs; issues/obstacles to start up of Federal programs
Suppliers of biobased/compostable base resins (metabolics/BASF/Dupont/Natureworks LLC/etc.)
Start with hot topics identified this year; continue to advance discussion
End user marketing
Bioretention emphasis
Pathways to action—local, national, state
Regulators to explain process of new regs—Federal and state
Qualitative research results
Maturity specs—field tests
People from landfill business
Case studies of composting in DC/VA/MD area. Specific obstacles to composting in DC/VA/MD area (land cost, population density, etc.). Siting and regulatory issues, especially in DC/VA/MD area.

6. **I will volunteer for the organizing, sponsorship or other committee:**

sponsorship or contact and organizing help [no name]
Yes—Glen Johnston, Natureworks LLC
Yes—Steve Mojo, BPI; I will be happy to work on/or organize committees to help deal with identified issues that are relevant to compostable products.
Jim Marion, NYS DOCS

Appendix G

LIST OF ATTENDEES

Speaker contact information is available in the program in Appendix B

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